DOCUMENT RESUME

ED 289 683 SE 048 768

AUTHOR Marrett, Andrea

TITLE Squalls on the Nisqually: A Simulation Game. Ocean Related Curriculum Activities.

INSTITUTION Pacific Science Center, Seattle, Wash.; Washington Univ., Seattle. Washington Sea Grant Program.
SPONS AGENCY National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.; Washington Office of the State Superintendent of Public Instruction, Olympia.
PUB DATE 82
NOTE 70p.; Drawings may not reproduce well.
AVAILABLE FROM Pacific Science Center Giftshop, 200 2nd Ave. North, Seattle, WA 98109 ($6.00).
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Ecological Factors; *Environmental Education; Interdisciplinary Approach; *Land Use; Marine Biology; Marine Education; Oceanography; Role Playing; Science Activities; *Science and Society; Science Curriculum; Science Education; Science Instruction; Secondary Education; *Secondary School Science; *Simulation; *Social Studies; Water Resources
IDENTIFIERS *Project ORCA; Washington

ABSTRACT

The ocean affects all of our lives. Therefore, awareness of and information about the interconnections between humans and oceans are prerequisites to making sound decisions for the future. Project ORCA (Ocean Related Curriculum Activities) has developed interdisciplinary curriculum materials designed to meet the needs of students and teachers living in Washington State. Each activity packet provides the teacher with a set of lessons dealing with a particular topic related to the oceans. Included are student worksheets, lesson plans, and a bibliography. This guide, designed for the grade 10 through community college levels, contains a simulation game about land use decision making in a coastal zone environment. The simulation is based on a land use proposal submitted by the Weyerhaeuser Company for the development of land near the Nisqually Delta. The students are given the background to the historical development of the Nisqually Delta and relevant information from the environmental impact studies completed for the Nisqually. Through role-playing, students learn about the socio-political and economic interaction involved in a decision making process. Students are encouraged to research their roles and determine positions based on the data. (TW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

SQUALLS ON THE NISQUALLY: A SIMULATION GAME

ED289683

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

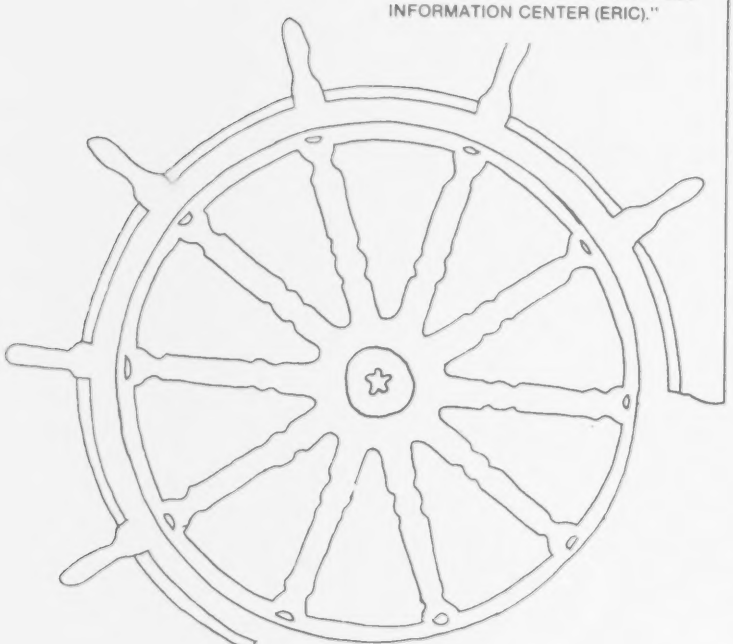
☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Andrea Marrett

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."



SE 049 748

ORCA

OCEAN RELATED CURRICULUM ACTIVITIES

PACIFIC SCIENCE CENTER / SEA GRANT
MARINE EDUCATION PROJECT

Andrea Marrett, Manager
Andrea Marrett, Writer

BEST COPY AVAILABLE

ORCA PUBLICATIONS

ELEMENTARY

High Tide, Low Tide (4th Grade)
Life Cycle of the Salmon (3rd - 4th Grade)
Waterbirds (4th - 5th Grade)
Whales (4th - 6th Grade)

JUNIOR HIGH

Beaches
Beach Profiles and Transects
Early Fishing Peoples of Puget Sound
Energy from the Sea
Literature and the Sea
Tides
Tools of Oceanography

SENIOR HIGH

American Poetry and the Sea
Marine Biology Activities
Marine Biology Field Trip Sites
Marshes, Estuaries and Wetlands
Squalls on Nisqually: A Simulation Game

©Copyright by Pacific Science Center, 1982

This activity packet was produced at the Pacific Science Center in cooperation with Washington Sea Grant and Office of the Superintendent of Public Instruction. Permission to reprint these materials is subject to approval by the Pacific Science Center. For permission or further information contact the Pacific Science Center, 200 Second Avenue North, Seattle, WA (206) 625-9333.

PROJECT ORCA

The ocean? It's 2 miles away; it's 200 miles away; it's 2000 miles away. What does it matter to me? For those students who live close to the ocean, a lake or a stream, the effect of water might be more obvious. For the student who lives on a wheat farm in the arid inlands, the word ocean is remote. It may conjure up images of surf, sand and sea gulls, experiences far removed from their daily lives; or it may have no meaning at all. Yet for that same youngster, the reality of the price of oversea wheat shipments or fuel costs for machinery are very real. The understanding of weather and its effects on the success or failure of crops is a basic fact of everyday life. The need for students to associate these daily problems with the influence of the marine environment exists. It requires exposure to ideas, concepts, skills and problem solving methods on the part of the youngsters. It also requires materials and resources on the part of our educators.

The goals of ORCA (Ocean Related Curriculum Activities) are: 1) to develop a basic awareness of ways in which water influences and determines the lives and environments of all living things; and 2) to develop an appreciation of the relationship of water to the study of the natural sciences, social sciences, humanities and the quality of life.

ORCA attempts to reach these goals by: 1) developing interdisciplinary curriculum materials designed to meet the needs of students and teachers living in Washington State, 2) developing a marine resource center, and 3) providing advisory services for marine educators. In conjunction with these efforts, ORCA is coordinating communication among educators throughout the state and the rest of the nation.

The curriculum materials are developed to be used in many areas including the traditional science fields. They consist of activity packets which fit existing curricula and state educational goals and are designed for use as either a unit or as individual activities.

The ocean affects all our lives and we need to be aware and informed of the interconnections if we are to make sound decisions for the future of the earth, the ocean and our own well being. We hope that through Project ORCA, teachers will be encouraged to work together to help students understand and appreciate the ocean and the world of water as a part of our daily existence.

ACKNOWLEDGEMENTS

The senior high series of ORCA (Ocean Related Curriculum Activities) is the product of a cooperative effort between many people and organizations. The primary responsibility for the program belongs to the Pacific Science Center, where the materials were developed. Financial assistance and technical support were provided by the National Oceanic and Atmospheric Administration (N.O.A.A.) Sea Grant, held by the University of Washington.

TRIAL TEACHERS

Trial teachers help us by testing the materials with students in the classroom and by reading, evaluating and offering suggestions for more effective curriculum. The teachers who gave their time, effort and advice were:

Bill Bond
Bill Brockman
Dave Brubaker
Cecelia Moore
John Pauls
Shirley Pauls
Kathy Sider

CONSULTANTS

A variety of people were asked for information, advice and help during the development of the curriculum. Their support and interest were greatly appreciated.

The many people and organizations who provided technical assistance and expertise were:

King County Planning Commission
League of Women Voters
Seattle Aquarium
Weyerhaeuser Industries

Lexie Borrie-Bakewell, U.S. Geological Survey
Dick Butler, King County, Division of Resource Planning
Bill Eckel, King County, Divison of Resource Planning
Ellie Henke, U.S. Fish and Wildlife Service, Nisqually Delta
Ron Hirschi, Washington State Department of Game
Ernie McDonald, U.S. Forest Service
Jed Marshall, Seattle Audubon Society
Sam Mitchell, Federal Way School District
Alvie Moritz, Edmonds School District
Liz Sears, Edmonds School District

The aid, advice and encouragement of the following educators was essential to the successful development of this project:

Lynda Blakely, Pacific Science Center
Ralph Carlson, Evaluator
Claire Dyckman, Environmental Education Program, Northwest Section, Washington State
Lolly Greathouse-Smith, Environmental Education Programs, Northwest Section, Washington State

Melinda Mueller, Poet-Botanist, The Northwest School of the Arts, Humanities and Environment
Shirley Pauls, Edmonds School District.

A sincere thank you to two consultants who gave extensive time, support and special expertise:
Alyn Duxbury, Ph.D., Assistant Director of New Programs, Divison of Marine Resources, University of Washington
David Kennedy, Supervisor of Science, Environmental Education and Marine Education, Office of the Superintendent of Public Instruction

ADVISORY COMMITTEES

The Marine Education project was reviewed annually by the Sea Grant Site Evaluation Committee. We thank them for their advice and support.

Continuing guidance for the program direction was provided by the Pacific Science Center Education Committee, the members of which are:

Levon Balzer, Ph.D., Dean of Instruction, Seattle Pacific University
Helen Frizzell, Teacher, Northshore School District
Charles Hardy, Coordinator, Math and Science, Highline School District
David Kennedy, Supervisor of Science, Environmental and Marine Education, Office of the Superintendent of Public Instruction
Roger Olstad, Ph.D., Associate Dean of Graduate Studies, University of Washington, Committee Chairperson
Alice Romero, Teacher, West Seattle High School, Seattle School District
William Stevenson, Superintendent, Shoreline School District
Mark Terry, Associate Director, Environment, The Northwest School of the Arts, Humanities, and the Environment, Seattle

STAFF

Finally, the production of the senior high series could only occur with the immense help of staff members who were instrumental in creating, developing and supporting this project.

As one of the curriculum writers for the senior high series, I can truly appreciate the efforts of the other writers:
Cecelia Moore, John Pauls and Peggy Peterson

The efforts of all people responsible for graphics, design and paste-up are greatly appreciated:
Laurie Dumdie, paste-up
Susan Lundstedt, graphics
Valene Starrett, cover design

The necessary job of reviewing, editing and typing take time and patience. Those who handled that task were:
Lynda Blakely, editing
Peggy Peterson, editing
Maxine Fischer, typing

Most especially I want to thank the Director of Education and Project Investigator, Bonnie DeTurck; Laurie Dumdie, the Marine Education Assistant; Greg Rhodes and Peggy Peterson for their continued support and efforts for the marine education project.

Andrea Marrett
Manager, Marine Education Project
Pacific Science Center
200 Second Avenue North
Seattle, WA 98109

SQUALLS ON NISQUALLY: A SIMULATION GAME

ABSTRACT: Squalls on Nisqually is a simulation game about land use decision making in a coastal zone environment. The simulation is based on a land use proposal submitted by the Weyerhaeuser Company for the development of land near the Nisqually Delta. The students are given the background to the historical development of the Nisqually Delta and relevant information from the Environmental Impact Studies completed for the Nisqually. Through role-playing, students learn about the socio-political and economic interaction involved in a decision making process. Students are encouraged to research their roles and determine positions based on the data. The simulation process can be easily adapted for other land-use issues.

SUBJECTS: Social Studies, Economics, Political Science, Environmental Education

GRADE LEVELS: 10 - 12, Community College

WRITTEN BY: Andrea Marrett

TABLE OF CONTENTS AND OVERVIEW

PAGE

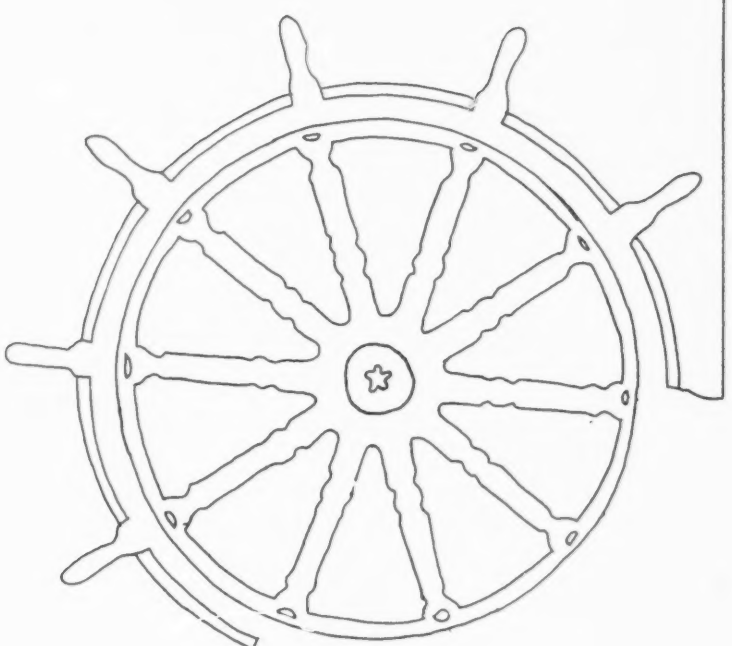
PART 1: SQUALLS ON THE NISQUALLY: A SIMULATION GAME (3 - 15 DAYS) 4

Part one provides the background information about the Nisqually Delta, its geography, ecology and historical use. Included in the first part are the specific instructions for playing the simulation game and an introduction to the land use proposal from Weyerhaeuser Company. Role playing cards are included.

PART 2: NISQUALLY PERSPECTIVES 38

Part two provides student readings from various sources on the proposal from Weyerhaeuser and the reactions and opinions from organizations and individuals regarding the proposed use of the old Dupont site.

EVALUATION, VOCABULARY AND BIBLIOGRAPHY 54



PART 1:
SQUALLS ON THE NISQUALLY:
A SIMULATION GAME (3 - 15 DAYS)

PART 1: SQUALLS ON THE NISQUALLY: A SIMULATION GAME (3 - 15 DAYS)

CONCEPTS:

1. The Nisqually Delta region is one of the remaining 'natural' salt marsh environments in Puget Sound, and is a preserve or refuge for plants and animals.
2. Issues, resulting in land-use decision making, occur when two or more prospective uses are in conflict.
3. Resolution of conflicts may have beneficial or adverse impacts on the economy, the socio-cultural environment, the ecology of the region and the political structure and process.
4. Individuals making land-use decisions need to assess facts, long and short term impacts, and personal values.

OBJECTIVES:

The student will demonstrate ability to:

1. state the specific issues surrounding the land-use potentials of the Nisqually Delta.
2. understand the positions taken by the principal protagonists involved in the Nisqually Delta conflict.
3. analyze each position for its potential impact on the economy, politics, socio-cultural environment and the ecology of the region.
4. understand the processes of conflict resolution available in the state.

TEACHER PREPARATION:

1. Read the teacher information: "Nisqually Delta, A Place of Conflict"
   "Game Suggestions"
   "Squalls on the Nisqually"
2. Read student handout, "Nisqually in Conflict"
3. Read or review the student readings, articles, interviews from "Part Two - Nisqually Perspectives"

MATERIALS:

1. 8 - 10 Petition Forms
2. Cards made of each role description
3. Class sets of: "Student Survey Forms"
   "Evaluation Forms"
4. Copies of readings/articles from "Part Two - Nisqually Perspectives." You may duplicate class sets of each reading, or have several duplicated sets available to students as reference materials.

PROCEDURES:

1. Have students generate examples of conflict where there were two or more possible uses of something (like a facility, an area, or an item) and the uses were mutually exclusive. That is, the two uses were incompatible. An example might be the use of an auditorium stage for band rehearsal and drama rehearsal at the same time. Or perhaps the placing of school portables on the soccer field. Personal examples could be used, or community conflicts might be raised.
2. Have students formulate ways to resolve conflicts. Move from the specific resolution suggestion to a more general, broad description of resolution strategies. For example:
   a. one person buys out the option of the other (an economic solution)

b. an authority person makes a decision (litigation)
c. arbitration
d. negotiation
e. political
f. etc.

3. Assign the students to read "Nisqually in Conflict". This reading gives background information about the Nisqually Delta, its geography, ecology and recent history. It discusses the first challenge to the development of the Nisqually Delta and its ultimate resolution.
4. (Optional) Rather than have students read the final section on the conflict resolution from "Nisqually in Conflict," have them write a scenario that resolves this conflict based on the resolutions suggested by the students in the earlier activity. Tell the students that this conflict has in fact been resolved, but do not at this point tell them what happened. When the assignment is done, relate the information from the final section of the student reading.
5. (Optional) Instead of having the students write their conclusions, have them form groups and undergo a group process resulting in a group decision about what they think should happen. You may then either give them the current status information or have the students contact the Department of Ecology or the Nisqually Delta Association.
6. Have the students complete the "Student Survey Form." This survey is designed to raise consciousness about conflicts concerning Puget Sound waters as an environment, its industry, and the economy. There are no "right" or "wrong" answers to the survey, just value judgements. However, as students become more knowledgeable, their answers will probably reflect these suggested answers:

   Agree - #4, 5, 6, 7, 10
   Disagree - #3, 8, 9, 11
   Undecided - #1, 2

7. (Optional) Following this entire activity unit, it might be useful to have the students complete the survey form again to determine if they have altered their opinions or attitudes.
8. Introduce the simulation game - "Squalls on the Nisqually or Any Port in the Storm." Explain that it is only a game, but a game based on facts. Assign roles to students or let them select their roles. Read the teacher information sheet "Game Suggestions" for details on how to organize this activity for the best success. Hand out the game procedures to the students. Answer any questions the students might have on how to proceed with this game. It is imperative that as the teacher you instill in them the incentive to play the game as realistically as possible.
9. During the simulation game readings from "Part Two - Nisqually Perspectives" should be given as assignments. They allow

students to accumulate Influence Points (I.P.) If assignments are completed and turned in on time then I.P.'s may be added to the student role in variable amounts (determined at the teacher's discretion regarding the quality of the work). The suggested number of I.P.'s is the maximum that should be allowed for successful completion of the assignments. This also is a way of identifying student achievement and can be used for the student's grade evaluation. Completed student readings are equal to 15 I.P.'s. The student worksheet covering the student readings is worth 25 I.P.'s. The student worksheet on the vocabulary list of words to be defined is worth 25 points. Both worksheets are located in "Part Two - Nisqually Perspectives."

10. Following the simulation game, have the students complete the student evaluation.
11. (Optional) Show the film Billion Dollar Estuary (available from the University of Washington - see the Bibliography for further information). This film is an excellent depiction of the conflict and interaction between human uses of tidelands and resulting damage to the estuaries. Have students take notes and write a short summary following the film. This completed activity is worth 15 I.P.'s.
12. (Optional) Show the film Ecology of a Tidal Slough (it is available from the University of Washington - see the Bibliography for further information). Have each student write a summary of the film and include within this summary statements about the interaction between the physical environment, the birds, the mammals and the invertebrate animals. This completed activity is worth 15 I.P.'s.
13. (Optional) Show films The Endangered Shore and/or Crises in the Estuary. Use the film guide and activities written for this and produced by C.O.A.S.T. (see the Bibliography for further information). This completed activity is worth 20 I.P.'s.

EXTENDED ACTIVITIES:

1. Take your students to the Puget Sound Model at the Pacific Science Center. The model and the instruction that is given allows students to visualize the circulation patterns within the Puget Sound Estuary. Nearby the Puget Sound Model is the Environmental Monitoring Center, which has displays on soil and water as elements of the environment that are important to monitor. Also nearby, is a three dimensional map of the Nisqually Delta area.
2. Take your students on a field trip to the Nisqually National Wildlife Refuge. The refuge is developing activities for the region, including field activities, environmental activities, nature trails, etc. Contact:

   Bill Hesselbart or Ellie Henke
   100 Brown Farm Road
   Olympia, WA 98506 Telephone: (206) 753 9467

3. Contact Joel Rogers for a slide presentation on the Skagit tide flats. His address is: 2421 First Avenue, Seattle, WA 98121.

3. Contact the Nisqually Delta Association (206) 357 6328. Many of the people in the Nisqually Delta Association have resources such as slide shows, documents, research and may act as possible speakers.

Teacher Information

NISQUALLY DELTA, A PLACE OF CONFLICTS

An Historical Overview

In 1965 the Nisqually Delta was viewed by the Burlington Northern Railroad to the west and the Port of Tacoma to the east as a possible location for a deep water port. Environmental groups were opposed to the proposals, since the Nisqually salt marsh and estuary is one of the last unspoiled estuaries in the world. Essentially, the environmentalists were told to purchase the land if they wanted to preserve it. With the aid of the Nisqually Delta Association, money was obtained to buy land for a bird and animal refuge. As of now the state fish and wildlife department is in the process of completing the final purchases of land.

The Nisqually National Wildlife Refuge will probably include up to 3000 acres of land, from the sharp ridge west of McAllister Creek to the jetty east of the Nisqually River. The managers of the refuge are currently planning the use of the delta area. Within the delta will be an area of controlled hunting, a location for bird waters, a site for scientific research and a place of education for the public. Nature trails and an environmental education center are being planned.

There was a strong belief by many that the successful formation of a wildlife refuge on the delta would protect the estuary for now and the future. However, controversy and conflict still exist.

The Weyerhaeuser Proposal

In 1976, Weyerhaeuser purchased the old Dupont site and began planning a new complex. The old Dupont dynamite plant and adjacent lands constituted about 3200 acres (5 square miles) and cost $12 million to acquire. The land is north and east of the refuge site and is bounded principally by Fort Lewis and the Lonestar Cement Company property. (The Weyerhaeuser Company is currently in negotiation with Lonestar to purchase or trade for that strip of land.)

According to a Weyerhaeuser spokesman, the existing pier, railroad bed and plant can be used by Weyerhaeuser with some modifications. Weyerhaeuser affirms that these proposed modifications will improve the facility, meet the needs of the company and will not impact the delta.

The first part of the Weyerhaeuser proposal is to lengthen the existing pier from 600 feet to 1300 feet in length. It also wants to orient the pier in a northerly direction. Weyerhaeuser claims no dredging is necessary, as the existing pier can already accommodate ships up to 40 foot drafts.

Secondly, Weyerhaeuser also plans a 300 to 500 acre marshalling yard and warehouse facility. This will be located on the uplands and will service the dock via a road system which will replace an existing railroad bed.

Teacher Information

Weyerhaeuser claims that the new facility is necessary since the need for facilities to export wood products continue to increase. Furthermore, it is difficult for Northwest (lumber) producers to compete in the East due to high costs of transportation. Therefore, it is logical to orient to world markets, principally the Far East.

Weyerhaeuser also states that there will be an insignificant increase in the number of ships to dock at the facility. It is proposed that about 3 ships a month will dock at the pier. This is only a slight increase over the number that called at the old Dupont facilities.

Further, there will be no ship fueling facilities at the dock. This will be done elsewhere if required. Vehicles needing fuel will either be driven to the uplands or serviced by a mobile tank truck.

Weyerhaeuser Industries conclude that impact on the estuary will be slight as the site is separated by both distance and topography from the delta. Care has been taken in planning the proposed changes to observe potential environmental impact. Baseline studies have been executed for their environmental impact statement at the cost of $1½ million.

The Nisqually Delta Association

Association members have expressed concerns about the Weyerhaeuser proposal. Many feel the Weyerhaeuser proposal constitutes a threat to the estuary that people worked diligently to protect by finding funds to purchase the land.

The Weyerhaeuser proposal is the initial movement toward a long term future establishment of a new wood products industry. The proposal only covers a small portion, 10 percent, of the land purchased by Weyerhaeuser. The initial development costs warrant long term expansion towards the goal of shipping finished wood products. Weyerhaeuser would still have 90% of the land which could be used to build wood processing and paper mills.

Association members felt that increased industrialization of the site could jeopardize the wildlife refuge. Of particular concern is the establishment of a pulp mill, because they feel that the current state of technology for water and air pollution controls and the current enforcement of the air and water pollution standards leaves a lot to be desired.

Weyerhaeuser proposes to have larger ships come more frequently to the port than the Dupont industry. Larger ships mean decreased maneuverability and increased frequency means increased potential for accidents. The threat of these vessels comes from exhaust oils, spills, garbage, oily water from the pumps, a certain amount of bilge water and log rafts (which means bark in the water and the problems associated with wood leacheates).

THE CURRENT STATUS

As a teacher it will be useful to continually check with the State Department of Ecology to verify the current status of this controversy.

The Nisqually fight will only be resolved through the long process as dictated by the Shorelines Management Act. The procedure was begun by Weyerhaeuser Industries in 1976 when it requested the Department of Ecology to hold public hearings. Since then, the baseline studies and the environmental impact studies have been completed.

The city of Dupont, as the lead agency in determining local shoreline uses, must publish the draft Environmental Impact Statement. Public hearings must be held where concerns may be voiced prior to applying for the necessary permits. When Weyerhaeuser applies for the permits, the various agencies involved must then make a decision to either approve or reject the Weyerhaeuser proposals.

NOTE:

The city of Dupont did in fact accept the Environmental Impact Statement. Weyerhaeuser applied for two permits, a shoreline variance permit and a conditional use permit. The issuance of the permits was contested legally. Hearings before the Shoreline Hearings Board are expected in early 1982. If permits are approved for Weyerhaeuser, the plans can proceed, unless contested in Superior Court. If permits are not approved, Weyerhaeuser has the option to examine the reasons and either alter plans to meet conditions or withdraw the proposal. (ed. 12/81)

On January 13, 1982, the Shoreline Hearings Board approved the first of the permits for Weyerhaeuser. The second permit hearing is pending, but expectations are that it will also be approved. (ed. 1/82)

Teacher Information

SQUALLS ON THE NISQUALLY

"Squalls on the Nisqually or Any Port in a Storm" is a simulation game about the land use conflict over the Nisqually Delta. The Nisqually Delta has been the focal point of two major conflicts in recent years. The first, involving the Nisqually Delta region directly, was resolved primarily through legal and economic means. The second and current conflict over the Nisqually is the focus of this simulation game. Students learn about the political processes, but not the specific political mechanisms, for solving land-use conflicts in the state of Washington.

"Squalls on the Nisqually" is a model game that can be used for other land-use conflict simulations. The suggested roles for this game have been given, however, students may easily generate their own, even for this activity. Students may also be assigned to conduct their own interviews of the principal and secondary protagonists in this (or other) issue.

Prior to playing this simulation game, read the student directions carefully. Try to anticipate student questions regarding roles, procedures and/or facts about the Nisqually conflict. If this activity is used alone as a social studies unit, it is strongly advised that the teacher prepare by doing the student reading from Part 2. You might decide that it is necessary as background information for your students to read as well.

Squalls on the Nisqually is a simulation game based on fact, as well as personal feelings. Its purpose is to allow students to clarify positions regarding the sociological, economic, political, and scientific aspects of a current controversial issue. The students will be role-playing. Some of the roles represent actual persons and students should take care to reflect the position that that individual would take. For example, the President of Weyerhaeuser would take a strong stand in support of the proposed changes.

While the controversy is a real one and some of the roles represent real people, remind students that this is only a true-to-life game. There is no right or wrong answer. The results that occur in class may or may not reflect what will happen to the Nisqually. However, the interactions and decision making processes that occur in the game are similar to those in the political-economic-environmental arena. It may be useful to have some students research the actual procedure involved in making a change like the one proposed by Weyerhaeuser. The entire procedure is infinitely more complex. This game is simply designed to show some of the interactions that occur in making a land use decision. What the students will not fully appreciate are the powers and pressures brought to bear in the political decision making process that are not always rational from a lay person's point of view.

Teacher Information

Recognize that this activity requires some flexibility from you as a teacher. The number of factors that can influence the direction of the decision are enormous. During the activity try to focus on the 'realities'. That is, keep in mind:

1) political decision making processes are dynamic and subject to biases.
2) informed students, like informed voters, make better decisions.
3) the realities of the roles--that is, it is fine to be altruistic as long as you have food and shelter; or, it is fine to achieve more than food and shelter but individuals remain legally and morally responsible for their actions and how they restrict or impinge on others.

Since this is an actual controversy within the state of Washington, the teacher should take care to note what is the current state of affairs. This can be done by contacting the Department of Ecology (either a local office or state office) or some of the other agencies listed in the bibliography.

Eventually this conflict will be resolved. When that occurs continue this game as is, but at the end inform students of what really did happen. It's fun and useful to compare their decision with the actual one.

Teacher Information

GAME SUGGESTIONS

NOTE THIS NEXT SECTION GIVES SOME SUGGESTIONS ON HOW TO PROVIDE THE MOST SUCCESS FOR THIS ACTIVITY. IF YOU HAVE HAD EXPERIENCE WITH SIMULATION GAMES, AND/OR FEEL COMFORTABLE WITH THE DIRECTIONS TO THE STUDENT, BY ALL MEANS SKIP THIS EXTRA BIT OF READING. OTHERWISE . . .

On Roles - Perhaps the best way to assign and "manage" the roles is to cut out the role descriptions and paste them onto 3 x 5 cards. These cards can be kept in an index file and can be easily used for maintaining a record of accumulated Influence Points (I.P.'s) and with notations for evaluation grades. You might try the following system which is given as an example:

Front of card:

Doctor 35 years old

Resident of Dupont for 5 years. Father of 2 sons. His wife spends the summer months at the beach at Anderson Island, where they have a summer cabin. The 2 boys go with her.

25 I.P.'s

Name of Student

List of Completed Assignments	I.P.'s 25	First position on proposal
_____	_____	Pro
_____	_____	Con
_____	_____	
		Final position
Extra Activities:		on proposal
_____	_____	Pro
_____	_____	Con
_____	_____	
TOTAL I.P.'s	_____	FINAL GRADE _____

On Influence - As the teacher you can make determinations regarding relative influence points to be gained by students doing the extra activities. Included in this Teacher Information Sheet is a suggested list of Action Projects or Position Papers for students. You may wish to make copies of this list and distribute them to the students.

The motivations for doing these activities may come from several directions. One may be from a sense of competition (to win). Others may genuinely desire to know more about the subject. You will also have students who feel they just must do extra credit and then some who won't feel that any of this is worthwhile.

Teacher Information

It is realistic to recognize that students have such diverse motivations for doing such things. It is equally realistic to recognize the same is true of political action. Attitudes range from total involvement (for one reason or another) to total apathy. Hopefully as you see these things occur within the classroom, help students to see that such a spectrum of opinion occurs in the real political world as well. It might prove to be a valuable lesson to incorporate into the whole activity.

On the Election - This whole process can take as little or as long a period as you choose. If you have students who are very involved, give them the time to get their teeth into it. If the class lacks self motivation, then strive to keep the action moving and the interest level high.

A suggested schedule is:

Day 1 - Assign roles and the readings.
2 - Hand out the worksheet on the readings; students must state position.
3 - Nomination process, hand out vocabulary list.
4 - Begin campaign process; (Optional film)
5 - Complete campaign process; (Optional film)
6 - Election; appointment of D.O.E. personnel; begin hearings
7 - Hearings; students make final position decision
8 - Decision by board of review

Tabulate election results by making it as simple a procedure for yourself as possible. Distribute the role description cards to the students and have them add their total I.P.'s. Since each I.P. equals one vote, the correct number is important. Distribute ballots. A suggested ballot form is:

Student Name _____
County _____
Total I.P.'s _____
GOVERNOR: _____
Person A _____
Person B _____
COUNTY EXECUTIVE: _____
Person A _____
Person B _____
STATE LAND COMMISSIONER: _____
Person A _____

SUGGESTED ACTION PROJECTS (You can earn 15 Influence Points per project)

1. Draw a series of appropriate cartoons (like political cartoons in the paper)
2. Make a bulletin board
3. Make a clay map of the Nisqually Delta region and label where the proposed changes will occur
4. Make a scrapbook of newspapers and magazine accounts
5. Take a field trip
6. Take a series of slides
7. Conduct a survey
8. Attend some of the D.O.E. hearings
9. Write a poem
10. Interview authorities
11. Write a modern version of nursery rhymes
12. Make up a song (The Ballad of the Nisqually or something similar)
13. Make a topography map of the area using layers of cardboard
14. ETC . . .

POSSIBLE POSITION PAPERS (You can earn 15 Influence Points per paper: If you present your paper orally at the hearing, you can earn an additional 15 I.P.'s.)

Position papers require you to assemble and organize information in logical form and formulate an opinion based on the role you are playing and facts collected. Study the list and choose a topic and position. Or add your own topic to the list if you wish.

1. Private versus Public Ports
2. Oil Spills
3. The Lumber Industry in Washington
4. The Foreign Export Market (for lumber)
5. Bird Watching
6. State Game Preserves: Wildlife Refuges
7. Shoreline Management Act
8. Environmental Impact Statements
9. Pulp Mills
10. Water Quality Studies
11. Aquaculture
12. Weyerhaeuser Industries
13. Conservation Groups
14. Wood Products
15. Water Recreation
16. Marine Ecology
17. Heavy Industry and the Shore
18. Sport and Commercial Fishing
19. Beach Resorts
20. Wetlands (Tidelands, Estuary, Salt Marsh)
21. Etc . . .

NAME_____

STUDENT SURVEY

A = Agree
D = Disagree
U = Undecided

_____1. For the Puget Sound economy to be healthy, new industry must continue to arrive in the area.

_____2. Weyerhaeuser is a 'clean' industry. It doesn't pollute and is based on a renewable resource.

_____3. There is no threat to an estuary if an existing dock is elongated, as long as no dredging occurs.

_____4. An estuary is a semi-enclosed coastal body of water which has a free connection with the open sea and within which sea water is measurably diluted with fresh water from land drainage.

_____5. D.W.T. refers to the tons of cargo a ship is capable of carrying.

_____6. Most of the major ports in the U.S. today can handle ships having up to 40 foot drafts.

_____7. Industrial corporations are chiefly responsible for the nominal pollution of Elliott Bay (Seattle), Port Gardiner (Everett), and Commencement Bay (Tacoma).

_____8. The public ports are over used and it is becoming increasingly necessary for industries to develop their own private docks and ports.

_____9. The shorelands and tidelands are the property and concern of the state.

____10. The state land commissioner is responsible for managing, leasing and selling state owned shorelands. His/her objective is to make money to support public education.

____11. The Puget Sound estuary is being destroyed by so many pollutants introduced by industry.

NAME_____

NISQUALLY IN CONFLICT *

The Nisqually Delta is the largest undeveloped estuarine area in Puget Sound and the public as well as the private owners feel caught between the differing views of its future. Farm and railroad land; commercial, home, and recreational sites; private and public game preserves are all presently located within the boundaries of the delta--the flat lands near the mouth of the river created by deposits of silt over the centuries.

Estuaries are transition zones between free flowing rivers with their fresh water and the saline environment of the sea. Such areas are unique ecological communities which are vulnerable to change caused either by nature or by man. The abundant plant and animal life is complex, interdependent, and precariously balanced. Because of these characteristics of an estuary, alterations lead to unanticipated side effects. No estuarine area, once altered, has ever been returned to its natural state. (There are however, some current projects attempting to do so.)+

The vast amount of land in the Nisqually Delta, the deep channel at the mouth of the river and the strategic location make it attractive for development of a deep water terminal capable of handling today's super ships. A community could develop here which would foster trade between nations and add to the economic base of the Puget Sound region.

Although port or industrial development would bring economic benefits to lower Puget Sound, sizeable benefits would be realized from leaving the delta in its natural state. Each of the many alternatives for the Nisqually Delta must be weighed in terms of local, regional, state and national interest.

What uses are essential? Which, if any, can be provided elsewhere in the region? Are these some uses for which there are no alternative locations? How are present owners to be compensated?

The many-sided conflict is likely to grow more intense, particularly during the next legislative session. Study and fact finding will help clarify the issues, but ultimately the decision regarding the use of the delta will depend on which values we as citizens consider most important.

THE NISQUALLY REGION TODAY

Geography

The source of the Nisqually River is the Nisqually Glacier on the southern slope of Mount Rainier. The milky, glacial water flows through mountain terrain until checked by Alder Dam. It then flows through upland forest and plateau, valley and plain, until it empties into the Sound. Its entire 75 mile course forms the border between Thurston and Pierce Counties.

---

*Excerpted from "Nisqually in Conflict." Puget Sound Leagues of Women Voters, October, 1970, by permission of Karen DesVoigne, (editor)

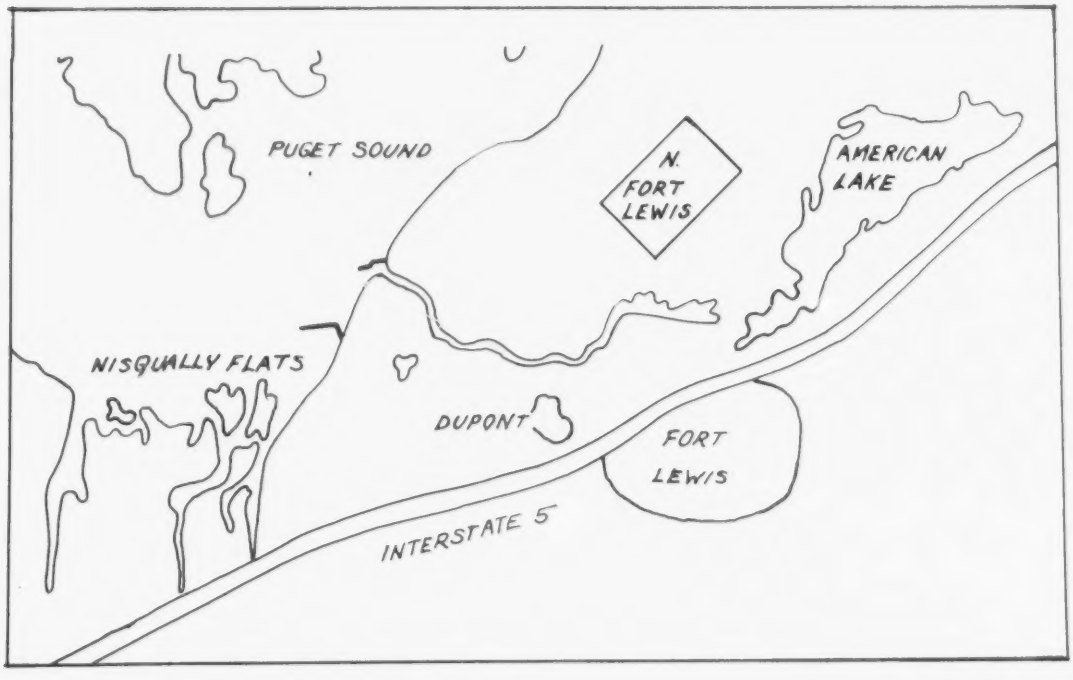
+Editorial addition by author

NAME_____

The flood plain, including all areas no more than 20 feet above sea level, starts near the town of Yelm. Here the river flows through a valley one half to one mile in width bordered on both sides by bluffs rising 200 feet. The valley is covered with trees and brush or cleared for pastureland McAllister Creek borders the bluff on the Thurston County side of the delta and empties into the Sound near Nisqually Head.

From the point at which Interstate 5 crosses the 4,000 acre delta the Nisqually divides into sloughs and channels of brackish water which flows through pastureland, salt marshes, and tidal areas, depositing accumulated silt. The deposit forms the 1,000 acre mud flats.

Just beyond the shallow water at the mouth of the river there is a steep drop-off in the waters of the Nisqually Reach - that portion between the Nisqually tide flats and Anderson Island. The depth increases in some places from 6 to 90 feet in less than 150 yeards. At mid-channel, between Anderson Island and the delta, the depth reaches 200 feet. The following map may help you visualize the delta region and will be helpful in understanding the various proposals for development and use of the delta.



NAME_____

Ecology

The Nisqually estuary is a link between land and sea. To this estuarine environment the river brings nitrates, phosphates, and eroded materials. The fresh, warm water of the river forms a layer which floats over the cold, salt waters of the Sound. The incoming tide then forces its way under the water of the river bringing with it nutrients from the sea. These incoming tides keep the nutrients of the river and land and sea from washing out into the open ocean, thus forming a nutrient trap. These nutrients are necessary for the growth of plankton - minute, drifting plants and animals that are the basis of the marine food chain. Currents and tides circulate and recirculate, not only trapping the nutrients in the estuary, but effectively distributing them.

In the sheltered sloughs and salt marshes of the delta fish deposit their eggs, and the estuary not only protects the newly hatched fish from harsh winds, waves and predators, but also provides them with abundant food. In addition to salmon, steelhead, crabs, oysters, clams, and geoducks, the Nisqually estuary is an important rearing area for flounder and sole.

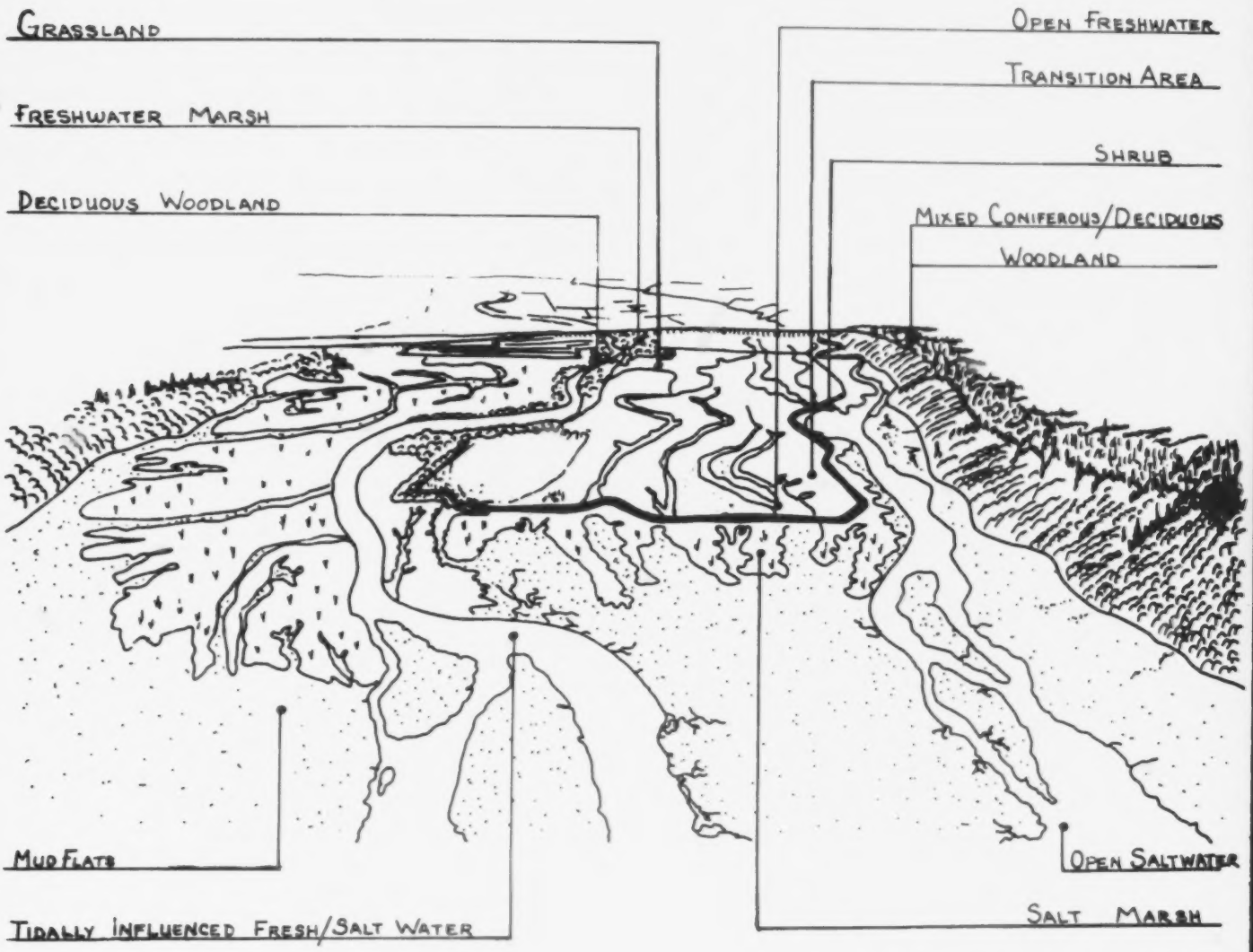
The salt marsh of the delta is a fertile area for plant life. Cordgrass, which grows there in abundance, produces seven times as much food value per acre as does wheat. In the final stages of decomposition, cordgrass and other grasses form a rich fertilizer called detritus, which is comparable to dry land compost. This fertilizer is washed into the nutrient trap where it provides food for plankton. Not only are estuaries termed nursery grounds for the sea, they are also the nesting and resting places for migratory waterfowl and marsh birds. Over 160 species of wild birds have been identified on the Nisqually delta. Cordgrass and eelgrass provide shelter and food for the migratory birds during their long seasonal north-south flights. Between the Columbia and Skagit Rivers, over a 200 mile distance, the Nisqually is the only place left in southern Puget Sound for migrant birds to rest. Migratory birds fly on four major routes over our country, roughly corresponding to the time zones. The Nisqually is on the major fly lane of the Pacific flyway.

One hundred and ninety species from 61 plant families of vegetation have been recorded here and at least 22 varieties of mammals have been seen.

Within this unique region are 11 different habitats. The map below locates and identifies the habitats. The view is a bird's eye perspective of the delta looking upstream from the open waters of Puget Sound.

NAME_____

BIRD'S EYE VIEW OF THE NISQUALLY RIVER DELTA AND HABITATS



NAME_____

What makes Nisqually Delta special is the variety of habitats in this open undeveloped area. In particular, the Nisqually Delta is a major resting place for migrating waterfowl. The diversity of habitat and unspoiled open area supports a wide variety of plant and animal life. The chart below lists just a few of the species likely to be found in the region. +

HABITAT	PLANTS	ANIMALS
Open fresh water		beavers, muskrats, pintails, mallards
Open salt water		sea lions, porpoises, grebes, gulls
Mud flat	spergularia, eel grass	clams, crabs, worms, racoons, minks, dunlins, sandpipers
Freshwater marsh	rushes, sedges, cattails	townsend voles, deer mice, Canada geese, red-winged blackbirds
Salt marsh	salt grass, pickleweed, Lyngbyes' sedge	great blue herons, red-tailed hawks, otters
Mixed coniferous forest	douglas fir, big leaf maple, sword fern, Oregon grape	porcupines, black-tailed deer, weasels
Deciduous woodland	black cottonwood, Oregon ash, blackberries, willows	woodpeckers, skunks chipmunks, garter snakes, newts
Shrub	Scotch broom, Himalaya blackberries, wildrose	rufous hummingbirds, American goldfinches, coyotes, cottontails
Grassland	clover, quackgrass	blackbirds, quail, frogs
Cropland	'hay'	ring-necked pheasants, great horned owls, red foxes
Tidally influenced fresh water	filamentous algae	salmon, trout, belted kingfishers

NAME_____

Historical Use+

Humans have long inhabited and made use of the Nisqually River watershed. Early American Indians inhabited the region relying on the rich diversity of plants and animals to provide subsistence. The Nisqually Indians were probably a large number of small bands sharing the environment.+

Euro-Americans arrived and began settling along the creeks and rivers of this watershed. The arrival of other settlers ultimately resulted in a treaty between the Nisquallis and Governor Issac Stevens. The Treaty Trees, where the treaties were signed, are located where the west bank of I-5 intersects with the east bank of the McAllister Creek.+

Agriculture and dairy farming became the main occupation of inhabitants. The agricultural use of the delta land continued until the mid-sixties. The Brown Farm was the supplier of dairy items and produce for nearby Olympia. Through time, the various owners of the Brown farm made improvements to the delta, increasing its potential as farm land. Some of the improvements were 2 complete dikes, protecting the croplands from saltwater flooding and the Twin Barns located in the middle of the diked area.+

During the mid 1960s changes began occuring in the region, causing enterprising business people to look at the Nisqually with new eyes.+

Projected Port Development

The Nisqually Delta possesses many of the requirements of a superport. There are sufficient railways to serve the area. There is direct freeway access to the delta. With dredging and backfilling there would be enough back-up space for the supercarriers. The natural water depth can handle superships. The Nisqually port site could become even more attractive if the suggested plans for a Columbia River-Puget Sound barge canal came to realization.

To understand the proposals for the delta, the background of the workings of port districts is essential.

Port districts have been in existence in the State of Washington since 1911. Port operations are broad in scope. Powers granted them by state law involve many specific uses of the land. They may acquire, construct, maintain, operate and condemn land for:

1. all forms of transfer and storage facilities for land, water and air transportation
2. all necessary navigation and harbor improvements.
3. ferry systems
4. toll bridges and tunnels
5. rapid transit systems including street, railroad and subway systems
6. idustrial sites and improvements

Under existing statutes of the State of Washington, a Port District has authority to levy up to 2 mills on the total assessed valuation of the taxable property of the County for general operation purposes. This is outside the 40 mill limit. The Port may also levy an additional 2 mills for a maximum of six years for industrial

+ Editorial addition by author

NAME_____

development without a vote of the people. They may also ask the public to validate general obligation bonds for the port authority.

The Nisqually River is the boundary between Thurston and Pierce Counties. Port authorities in both Tacoma and Olympia viewed the Delta as a location for a port.

Thurston County - The Port of Olympia adopted a Comprehensive Plan in 1949 that included development of the Nisqually Delta. The Port's 1965 Battelle Research Report, citing the lack of 'potential heavy-industry land having water access in Thurston County,' identified both the Nisqually and Hawks Prairies areas as possibilities for future development. The report found the per acre cost of developing the Nisqually would be higher than that of the Atlas Powder site located on Hawks Prairie, and recommended that the Port should investigate developing the Atlas site first.

The Port held public hearings in 1965 and amended their Comprehensive Plan to include 3,300 acres of Hawks Prairie and did establish a higher priority for industrial development on Hawks Prairie. The Port Authorities actively sought a buyer that would develop and industrial park on the Atlas site. In 1969 the Great Northern Railway, now the merged Burlington Northern Railway, purchased the land and requested that the presently unzoned land be zoned industrial.

The Burlington Northern purchase includes approximately a half mile of waterfront. The tidelands extend 1,000 to 1,500 feet where there is a steep dropoff making the area possible for a port development with either a long finger pier o a combination of dredging and filling. Unlike the Nisqually Delta, the Burlington Northern water site is not considered suitable for a large scale bulk or container superport. Any port facilities constructed at this site would probably be related only to the industry built there. The Burlington Northern is seeking leases but has not proceeded with definite plans while the zoning question still remains unresolved.

The Olympia Port has strongly supported Burlington's interest in developing an industrial park. The Olympia Port indicate they feel there would be no detriment to the Nisqually estuary from the Burlington site since it is three miles from the edge of the river. The regional manager for the Burlington industrial site has stated that they felt the land they own is not a wildlife habitat and not a part of the flats at all. He also feels that a large buffer zone would do a good job for the environment.

Meanwhile the Port of Tacoma made plans for the development of the Nisqually Delta.

Pierce County - The Port of Tacoma is a county-wide municipal corporation created in 1918. It encoumpasses the entire 1,676 square miles of Pierce County and is virtually an autonomous local government responsible directly to the people of the county.

The area of the Nisqually Delta under consideration by the Port of Tacoma as a terminal port lies in the northeast quadrant of the intersection of the freeway and the river. Of the 1,500 acres being considered, port officials have stated that they plan to use only 1,100 acres for the port. The remaining acreage would be planned to comprise two buffer zones, one between the port facility and the river, and the other between the freeway and the port. The reservation of theses 1,500 acres by the Port of Tacoma was made in accord with the Port's legal powers through amendment of the Port's Comprehensive Plan in December 1965. Prior to the amendment, public hear-

NAME_____

ings were held in August and September. Inclusion of this land in the Port's Comprehensive Plan along with the Port's right of eminent domain means that the Port can condemn the land at any time it sees fit. As of September, 1970, the Port of Tacoma does not own any large portion of land on the Nisqually Delta. The Pierce County Commissioners have not made any change in their zoning of the Nisqually area to date.

According to the Tacoma Port plan, they would fill the tideflats to the point at which an abrupt dropoff occurs and the water depth reaches 90 feet. The fill material would come from the dredging of a waterway and the leveling of a nearby bluff. The east bank of the Nisqually would be stabilized to isolate potential pollution, and a riverside drive would be added to provide scenic access to a marina site for small pleasure craft and other recreational facilities. Deep draft berths would front directly on the Sound with less draft provided in the man-made waterway. A unit train loop would connect with the Burlington Railway and encircle the bulk and general cargo terminal areas. Imports are expected to include iron ore from Austrailia, salt from Mexico, and oil from Alaska. Exports would include coal and grain.

The Nisqually Delta is considered by the Tacoma Port Authority as a national economic resource for it could provide the means of handling many strategic materials needed by the nation.

Regionally, the Tacoma Port views the development of the Nisqually as a means of stabilizing the economy of the Northwest. They feel employment would be high during the construction period of the port, but the primary benefit would be the establishment of basic industries which would use the import and export facilities. They think that diversificiation of the industrial base would lessen the region's dependence upon aerospace and wood products industries.

Port and industrial representatives hold to the position that their plans are compatible with the conservation concept. They feel that the delta at the present time is essentially inaccessible to the public. "portions of the tideflat west of the river are not part of the development, but the improved access for the public will promote increased utilization." The Port Authorities insist that no conflict exists between superships and their proposal to establish a marina for small pleasure craft since the big ships would be moving very slowly. Also, Washington State has an oil spillage law considered to be one of the strictest in the nation. Individuals and companies are fully liable for cleanup and damage expenses of any oil spill, deliberate or accidental.

* The preceeding reading was excerpted from "Nisqually in Conflict," prepared by the Puget Sound Leagues of Women Voters, October, 1970 and was included by permission of the editor, Karen DesVoigne. Within the reading are sections identified by + which are editorial additions by the author of Squalls on Nisqually.

NAME_____

Conflict Resolution

The Tacoma proposal galvanized the public into action. Concern over potential development of one of the two remaining 'natural state' estuaries generated the formation of the Nisqually Delta Association. Working through legislative and governmental action, citizens sought to protect the delta from exploitation and resource degradation. Members were essentially told to 'put their money where their mouth was.' The Washington State Department of Game began purchasing land and by 1967 had acquired approximately 616 acres of tideland and marsh area. A plan to ultimately protect and preserve the delta was developed by a task force which recommended the Nisqually River basin, from Mt. Rainier to Puget Sound, be managed as a glacier to ocean environmental system. Its specific recommendation was for the Nisqually Delta to be set aside as a wildlife refuge.

In January 1974 the Nisqually National Wildlife Refuge was approved and the systematic land acquisition and management program was begun. The Nisqually Delta region is now an open space refuge of quiet beauty. School children and interested adults visit the sanctuary and learn of the natural setting at the Educational Interpretative Centers - located at the Twin Barns. In 1981 the National Wildlife Refuge was ceremoniously 'opened' to the public.

Conflict over land use occurs when there are two or more attractive and viable uses for the area. Frequently, each possible use has its specific attrations which makes the decision making difficult. Further, the two or more uses are usually incompatible. Finally, the resolution for the conflict most often happens through legal or economic processes, involving the public and politicians.

The Nisqually Delta Association felt it had resolved the conflict over the Nisqually Delta and had ultimately preserved the Delta. But a parcel of land does not exist in isolation in the environment. It is subject to the influences of surrounding activity.

The Nisqually River conflict was not resolved for all time. Shortly after the purchase of the Nisqually Delta for the National Wildlife Refuge, Weyerhaeuser a private timber industry, announced plans to develop their acquired land, located to the east of the delta proper. It is the ensuing conflict that is the core of the following simulation game.

NAME _____

SQUALLS ON THE NISQUALLY or ANY PORT IN THE STORM

Procedures for the Simulation Game:

Objective

Your objective for this game is to get a political decision made in support of your position on the Weyerhaeuser proposal for the Nisqually-Dupont site. Read the following procedures to determine the best strategy for success.

Roles

1. You will be given, assigned, or allowed to choose a role to research and act out. You must determine how your 'person' would feel regarding the development of the Nisqually estuary by the Weyerhaeuser Corporation. In some roles, the decision will be obvious (based on that person's needs and occupation). However, its importance when compared against other decisions will not be so obvious. Its importance is related to your ability to present a strong case. Other roles and positions will not be so obvious and your choice opinion will be, in part, based on your own feelings.

2. You will be expected to state your position/opinion prior to the election. You may change sides once before the final decision is made, however.

3. Each role represents a person involved in the Nisqually conflict. Each person has a relative amount of influence he/she can exert. Influence is based on:

   a. his/her position in society
   b. his/her wealth
   c. his/her 'expert' knowledge
   d. his/her political position

Influence (called Influence Points, also known as I.P.'s)

1. The relative influence of each role is indicated by the Influence Points or I.P.'s which are noted with each role description.

2. I.P.'s can be gained by doing a number of activities. Required assignments, if completed and turned in, will provide a set amount of influence (I.P.'s).

3. Additional I.P.'s may be gained by doing additional activities. Such additional activities may include researching a topic or doing a project. Your teacher has more information.

4. The more I.P.'s you have the stronger, more powerful, your individual vote. You will be voting to elect the governor, a county executive, and the state land commissioner. Needless to say, as in any political campaign, you want to elect the person best suited for the job and the person who will support your point of view.

NAME_____

The Election

1. The elected positions are:

   a. Governor - This person is elected by everyone in the class. The governor has tremendous power to influence decisions. While not directly involved with the decision making process, this official will select the head of the Department of Ecology, who in turn will help make the Nisqually decision. The governor may have personal opinions and may be elected because of them. The governor is, however, responsible for the whole state. The governor is in a position to influence any appointed state official or bring political pressure to bear on any elected official involved with party politics.

   b. The County Executive - There are 2 county executive positions; one for Thurston County and one for Pierce County. Only residents of their respective counties may vote for these candidates. The county executives will be on the board of review that makes the final Nisqually decision.

   c. State Land Commissioner - This person is elected by everyone in the class. He/she may run a campaign based on his/her personal opinion on the estuary. The state land commissioner is to manage state lands; buy, lease or sell state lands in the best interests of the state and best uses of the land; and to generate revenue for the financing of public education. He/she is a member of the board of review that makes the final Nisqually decision.

2. The appointed position is:

   a. Head of the Department of Ecology (D.O.E.) - This person will be appointed by the governor. While the head of the D.O.E. is not subject to recall by the voters, he/she can be replaced by the governor. This person's role includes reviewing Environmental Impact Statements that are filed by corporations (or individuals) for use of shoreline areas. Before making a decision about the proposed useage, the department must hold hearings for the public on the issue. This person will chair the board or review and will help make the final Nisqually decision.

3. The election process consists of three phases:

   a. Nominations - Anyone in the class can run for one of the elected positions. To be nominated for the position, you must obtain a petition and have it signed by persons whose I.P.'s added together will equal 225 points. The county executive positions will need only 125 points, but all the signatures must be from residents of the county they will represent.

   b. Campaign - The campaign consists of trying to convince as many of the people as possible to vote for you. A written speech, an oral speech or campaign posters all might improve the candidates' chances of winning (as well as gain more I.P.'s). Campaign committees can be formed to promote and do such activities.

NAME_____

The Review Board

1. The review board shall consist of the appointed head of the D.O.E. who will act as chairperson and the 2 county executives and the state land commissioner.

2. The review board will hold a public hearing and listen to expert testimony and public opinion. Persons attending the public hearing giving testimony or stating opinions will be given I.P.'s.

3. The review board will listen to the public presentations and then evaluate the testimony in regards to:

   a. their job descriptions; the role they must play.

   b. the economic implications (for example, the increased tax base, available jobs, more trade, increased general income for the residents, etc.).

   c. the social implications (for example, more students in schools, increasing population density, urbanization, more and denser housing, more diversified culture, etc.).

   d. the environmental implications (for example what will the impact be on the estuary, water, air and noise pollution? etc.).

   e. the political implications of the decision.

4. The review board will make the decision about the use of the shorelands. It will determine whether Weyerhaeuser Industries can go ahead with their proposal; whether the proposal is acceptable with modification; or whether the proposal is totally unacceptable.

The Nisqually Decision - Playing and Winning the Game

1. The simulation game is played in basically two parts. The first part is the political process of campaigning and winning the election. This first part is crucial in terms of having people 'on your side' that have the power to make the decision. The second part is the final review and decision. This is the time to present the strongest case to the review board and have them 'side with you'.

2. The goal is to have the review board make a decision that is in support of your stated position. The 'winning' side will gain immeasurable Influence Points with their teacher regarding their grade for this activity. You may use whatever means you feel will be successful in causing the decision to be made in your favor.

NAME_____

PETITION FOR NOMINATION

Student's Name_____

Role Description_____

_____

_____

Position on Weyerhauser Industry Proposal:

Pro_____

Con_____

Other (state)_____

_____

Signatures	County	Total I.P.'s

ROLES FOR SQUALLS ON THE NISQUALLY

DOCTOR Pierce County Resident of Dupont for 5 years. He is 39 years old and moved here to get out of the rat race of city living. His wife spends the summer months at their cabin on Anderson Island. 15 I.P.'s	FISHERMAN Pierce County A long time resident of the county. He operates his fishing vessel primarily in the southern Puget Sound region. 5 I.P.'s
MAYOR OF DUPONT Pierce County A resident of the city. He is very concerned about maintaining local control in terms of decision making. He is concerned about the city becoming a retirement community. 25 I.P.'s	SUPERINTENDENT OF SCHOOLS Pierce County Has been with the local school district for 8 years. The biggest concern is how to maintain the schools. An improved tax base would help solve the problems. 25 I.P.'s
REPRESENTATIVE FROM WEYERHAEUSER Pierce County A resident of the county who works at the general headquarters. She acts as a spokesperson for the company. She is only 25 and is concerned about her career. 10 I.P.'s	BANKER Pierce County President of the local bank for the past 10 years. Much of the bank's money capital had been invested in the Dupont Dynamite Manufacturing Plant. 15 I.P.'s
FARMER Pierce County Has farmed the lands near the Dupont site for many years. The farm is an old family homestead and has been farmed for several generations. 10 I.P.'s	REAL ESTATE SALESWOMAN Pierce County Operates her office in Thurston County where she sells view property that overlooks the Sound. 20 I.P.'s
RETIRED ARMY COLONEL Pierce County A resident of Dupont. He retired from the army 3 years ago. He had been stationed at Fort Lewis. He lives on a pension. 10 I.P.'s	LANDSCAPE ARCHITECT Pierce County Tends to bid only on large commercial jobs. Views the Weyerhaeuser complex as a potential customer. Spends free time on the wildlife refuge and is a member of the Audubon Society. 20 I.P.'s

ROLES FOR SQUALLS ON THE NISQUALLY

TEACHER Pierce County A physical education teacher at the local high school. His summer job involves directing the local recreation program. 10 I.P.'s	LONGSHOREMAN Pierce County Has been unemployed for 18 months. He is interested in working for Weyerhaeuser as a dock hand. 5 I.P.'s
MARINA OWNER Pierce County Owner of his own business for the past 25 years. Recently, the waters off Tacoma have become increasingly polluted. As a result, his gross income has declined 5% during the past 5 years. He is a member of the House of Representatives. 25 I.P.'s	PRESIDENT OF THE CONSERVATION CLUB Pierce County Has been actively involved in trying to protect the Nisqually Delta for 12 years. 25 I.P.'s
PRESIDENT OF SCHOOL BOARD Pierce County Elected to the school board 3 years ago. Is very concerned about the quality of the education. Is also concerned about problems of population density as to how they affect the class size. 25 I.P.'s	RESTAURANT OWNER Pierce County The restaurant specializes in seafood and the summer tourist trade. Would like to see the population of the area increase. 15 I.P.'s
HOUSEWIFE Pierce County Mother of 2 children, ages 2 and 5. Her husband is employed by the local department store. 10 I.P.'s	GROCERY STORE MANAGER Pierce County Lifetime resident of Pierce County. He is 40 years old and a confirmed bachelor. He owns a large pleasure boat. 10 I.P.'s
PHARMACIST Pierce County Resident of Tacoma suburbs for 16 years. He and his wife manage their own drug store. She is a member of the state Senate. 25 I.P.'s	GENERAL CONTRACTOR Pierce County A lifetime resident of the county. He is an independent owner of a small construction firm. The increasing prices of wood products has made it difficult for him to compete with the "major" companies. 15 I.P.'s

ROLES FOR SQUALLS ON THE NISQUALLY

HARDWARE STORE OWNER Pierce County His business depends a lot on the lumber construction and housing industries. His wife is very active in the conservation movement in the area. 15 I.P.'s	AUTO MECHANIC Pierce County Mechanic for the past 15 years. Three years ago he was elected President of the local Mechanics Conservation Organization. He spends much leisure time hunting and fishing. 10 I.P.'s
MARINE BIOLOGIST Pierce County A member of the faculty at Evergreen State College. Is involved deeply with research on salt marsh estuaries. She is the mother of 4 children and her husband operates a local investment firm. 25 I.P.'s	INVESTMENT CORPORATION EXECUTIVE Pierce County A resident of Tacoma. She is very concerned and interested in her career. 25 I.P.'s
LOGGING TRUCK DRIVER Pierce County She drives a logging truck for Weyerhaeuser. On her leisure time, she walks along the beach and collects drift wood. 5 I.P.'s	ARMY CAPTAIN Pierce County A career officer who is stationed at Fort Lewis. He and his wife like the Pacific Northwest and hope to remain here for a long time. 5 I.P.'s
CAFE WAITRESS Pierce County Recently divorced and living with her 3 year old son at her parents' home. Her former husband had been employed by Dupont until the plant closed. 5 I.P.'s	
LAWYER Pierce County A graduate of the University of Washington Law School in nearby Seattle. His specialty is corporation law. He plans to run for the Senate. 10 I.P.'s	

ROLES FOR SQUALLS ON THE NISQUALLY

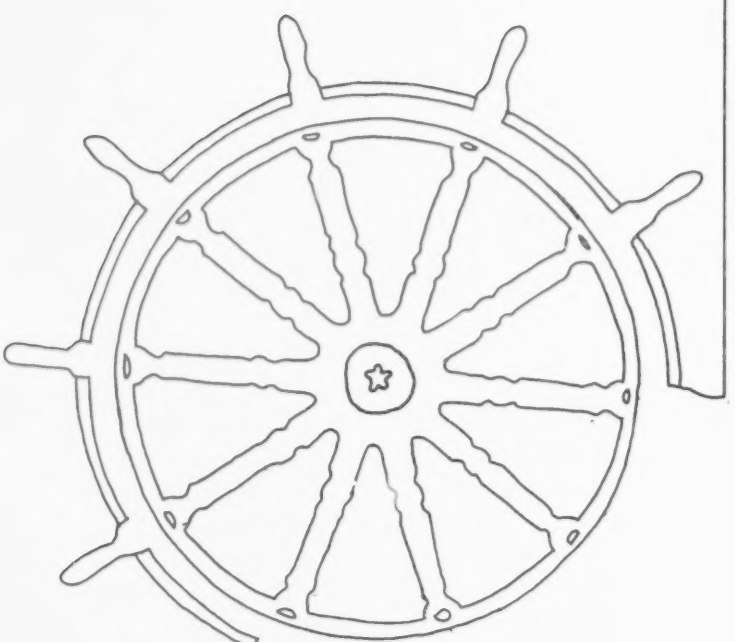
ADVISOR TO STATE SUPERINTENDENT OF PUBLIC INSTRUCTION Thurston County Has been a member of the staff at S.P.I. for 4 years. Has developed a special interest in environmental education. 20 I.P.'s	MANAGER OF BURLINGTON NORTHERN Thurston County A resident of Thurston County since 1963. If the port is established his business would expand. 15 I.P.'s
MANAGER OF THE WILDLIFE REFUGE Thurston County Has been instrumental in purchasing land for the refuge. Now is actively involved in planning for the use of the refuge. 20 I.P.'s	A FORMER STATE SENATOR Thurston County Has retired from political life. Spends a lot of leisure time doing beach walks. 20 I.P.'s
TELEPHONE REPAIRPERSON Thurston County Has been an installer/repairperson for 11 years in Olympia. 10 I.P.'s	REPRESENTATIVE Thurston County A member of the House of Representatives. She was the former president of the local chapter of the League of Women Voters. 25 I.P.'s
BEAUTICIAN Thurston County Recently divorced and living with her 2 children in a small apartment. Her husband is in jail. 10 I.P.'s	GOVERNOR Thurston County A native of rural Thurston County. Has spent the past 20 years in public affairs. A major concern of the governor's is to continue to maintain a stable financial situation in the state. 30 I.P.'s
DRIVER ED. TEACHER Thurston County A teacher at a local high school for the past 13 years. Has been a state Senator for 4 years. 20 I.P.'s	

ROLES FOR SQUALLS ON THE NISQUALLY

GAS STATION ATTENDANT Thurston County A young girl who found this to be a good way to earn money for college. She works days here and nights at the snack shop. 5 I.P.'s	LAWYER Thurston County Employed by Weyerhaeuser as a legal advisor. Spends lots of time in Olympia helping the permit process to move along. 15 I.P.'s
UNEMPLOYED VETERAN Thurston County After returning from Vietnam wounded, this man has been unable to consistently hold down a job. 5 I.P.'s	BIRD WATCHER Thurston County She spends a lot of her leisure time in the wildlife refuge Her husband works as a dock hand at the local marina. 20 I.P.'s
PHARMACIST Thurston County She is a resident of the nice community that overlooks the wildlife refuge. She operates a small drugstore in the nearby town. 25 I.P.'s	FARMER Thurston County Lifetime resident of Thurston County. As a state Senator, he is on a committee to study industrial growth in the county. 25 I.P.'s
SUPERINTENDENT OF SCHOOLS Thurston County Has been Superintendent of the local district for the past 10 years. The district needs more money in order to develop an expanded vocational education program. 25 I.P.'s	MANAGER OF A CLOTHING STORE Thurston County Owns and operates a clothing boutique in a small shopping center. Is trying hard to make a go of the situation. 15 I.P.'s
ARTIST Thurston County Somewhat of a hermit. Has spent the last 7 years painting scenes of the beaches. The paintings are sold at art fairs and provide sufficient income to survive. 5 I.P.'s	USED CAR SALEMAN Thurston County President of a local conservation group. Most of his clients are interested in leasing cars during the times the legislature is in session. 15 I.P.'s

ROLES FOR SQUALLS ON THE NISQUALLY

OPERATOR OF A DONUT SHOP Thurston County Serves fresh hot donuts to early risers, including fishermen and legislators. 10 I.P.'s	HUNTER Thurston County Spends a lot of time in the refuge hunting. Works as a secretary for the state Senate. 10. I.P.'s
DOCTOR Thurston County Resident of Olympia. She works hard at private practice. Has opened up a little free clinic as well. 25 I.P.'s	LAWYER Thurston County She graduated from the University of Washington. She is currently on the staff of the governor. 25 I.P.'s
MOTORCYCLE SALESMAN Thurston County Has opened a motorcycle shop along with his brother. The shop is very successful. During the summer he builds sun decks for the local residents. 15 I.P.'s	LABOR LEADER Thurston County A self made man who spent his boyhood days in poverty. He has been a member of the House of Representatives. 5 I.P.'s
WOOD SHOP TEACHER Thurston County One of the most popular teachers in the local junior high. He also operates his own wood designs business. 5 I.P.'s	HOUSEWIFE Thurston County Mother of 5 children from the ages of 3 to 16. Her husband is employed by the State Game Department. 15 I.P.'s
PRIEST Thurston County From a family of 7 boys and 6 girls. He has been active in helping youth by counseling drug addicts. He is concerned with the high unemployment rate of many youths in the state. 15 I.P.'s	DEPARTMENT STORE EMPLOYEE Thurston County She started working at the large store as part of a work-study program while a student in high school. 5 I.P.'s

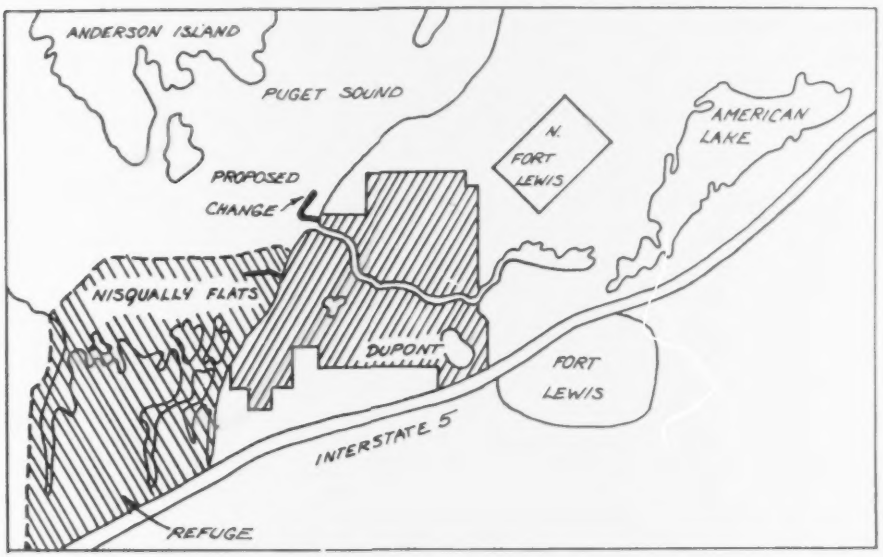


PART 2:
NISQUALLY PERSPECTIVES

NAME_____

NISQUALLY FLATS FIGHT, ROUND 2

by William Cushing



"We're not talking about a jetty. We're not talking about a superport. We're talking about a single-finger pier."--Woodrow Taylor, attorney for Burlington Northern.

"Are we talking about a large port development on the waterfront? No--just a dock."--J. R. Callahan, region vice president, Weyerhaeuser Company.

Trees were the resource fought over so bitterly in the recently settled Alpine Lakes dispute, but the sanctity of mud is just as much at issue in the environmental battle now taking place over the future of the Nisqually Delta tideflats.

From its headwaters on the Nisqually Glacier on the south slope of Mount Rainier, the Nisqually River makes its entrance into southern Puget Sound after turning through 70 miles of chlorophyllic geography. Somehow, unlike the state's and the nation's other rivers, its tideflats have survived the mindless indiscretions of the American developer, professional and otherwise. The Nisqually

NAME_____

estuary--where the fresh waters mix with the saline waters of the sea--is especially important to migratory birds. In fact, it forms the only flyway between the Columbia and Skagit rivers, serving as habitat for 165 species of waterfowl and other birds. Its constantly changing, delicately balanced ecosystem provides an environment for a diverse blend of plants and animals.

Environmentalist groups thought they had won their lengthy fight to save the delta--located between Tacoma and Olympia--a few years ago when they stymied plans of both city ports to turn the state's last undeveloped estuary into a deep water port. Now they aren't so sure.

Having killed the public port idea and created a national wildlife refuge, they are now faced with threats to the estuary posed by corporate attempts to build private ports on either side of the delta.

On the Thurston County side (the county line bisects the Nisqually River) the Burlington Northern railroad, backed by business and labor, is pressing hard for authority to build a pier at the former Atlas Powder site that would service a proposed South Sound Industrial Park. So far, the Department of Ecology has opposed the BN pier by rejecting an "urban" designation in the county's Shoreline Master Plan on the basis that shipping activities pose a potential threat to the Nisqually estuary. More hearings are scheduled for July 27, but the DOE apparently holds the power to overrule the County Commission by virtue of its jurisdiction over "shorelines of statewide significance," a classification which applies to the disputed area.

On the Pierce County side of the delta, the threat to the estuary is similar but the circumstances are quite different. Bordered by the Nisqually River on the south and Puget Sound on the west is a 3200-acre chunk of mostly forested land. Its owner, E. I. duPont de Nemours & Company of Delaware, is winding up a 70-year devotion to the cautious craft of making dynamite, an activity whose end has been made possible by the development of a less volatile explosive called Tovex. A water gel, Tovex is safer to handle, so the manufacturing location, whose trees have absorbed an occassional explosion in the past half century, will no longer be needed.

When Dupont first moved there in 1907, the site was a remote one. A mile or so from the dynamite plant gate, workers moved into well-kept little houses in the tiny company town of Dupont, which today appears to have changed by little (except for the lampposts, which this year are decked out in bicentennial red, white and blue). The plant facilities themselves are hardly visible behind the tall stands of timber which surround them. From Puget Sound, the only evidence of a close-by manufacturing operation is the dark wooden pier that angles into the water, waiting for ships that will no longer come to deliver raw material or to take away the dynamite from which it is made.

Whether ships will come for other reasons is at the core of new questions being asked about the old Dupont dock and the land that would be served from it.

NAME_____

Early this year the Weyerhaeuser Company said it had agreed to swap $12 million in other land holdings for the Dupont site and would take possession in January 1978. The property, said the company, would be turned into an export center for its forest products.

In the meantime, the usually savvy Weyerhaeuser has gone to work to gain public acceptance of that idea, which it needs to obtain the 25 to 27 permits from state and federal agencies. The company is making much of the originality of its approach to the planning process, which has involved "pre-planning" public hearings coordinated by the DOE, under instructions from Gov. Evans. It is a role that the DOE has so far found uncomfortable, exposing the agency to criticism that its relationship with Weyerhaeuser is too close for a regulator. And so far the preliminary hearings held last month have created more confusion than clarity among the public; Weyerhaeuser officials say they are frankly disappointed.

The public confusion, say some who have attended the hearings, has resulted from Weyerhaeuser's ambiguously stated intentions for the Dupont site. Even DOE head John Biggs is concerned about Weyerhaeuser's lack of specifics. "The company is keeping its plans a secret," said Washington Environmental Council member Nancy Thomas last week. "We've had seven months of public participation, and we still don't know anything more today than we knew last January."

What is known is admittedly general, explains Weyerhaeuser, because it wanted the public to articulate its concerns before it made some definite plans. Instead, the public hearings turned into festivals of complaint. Many who attended confused the occasion with the actual "permit process," said DOE hearings officer Ats Kiuchi. "But when we get to the permit state it'll be a whole new ball game."

At an informational hearing on June 9, Weyerhaeuser laid out its reasons for buying the Dupont site. Because high transportation costs make Northwest forest products uncompetitive in the Eastern United States, the company argued, Weyerhaeuser must stabilize operations in Western Washington to take advantage of more favorable freight rates to Europe and Asia. The Dupont site, it said, "provides the opportunity to establish a deep water dock for large vessels; provides a central location with a large area for the assembly of our products, both finished and raw materials; and provides an area for future location of manufacturing facilities aimed at export."

During the first three to four years of its ownership, Weyerhaeuser told those attending the hearing, it expects to develop a dock with loading equipment, an assembly area from which products will be moved to the dock and a supporting road and rail access. But the long-term goal, it said, will be "toward the shipment of finished goods,"including pulp and paper as well as wood products, that might be produced in new facilities built right there at Dupont.

In terms of jobs, Weyerhaeuser activities during the initial few years would just about replace the 150 provided by Dupont when it was making dynamite. As for the future, the company speculated that a "modern sawmill normally provides 200 to 300 jobs, a paper mill perhaps 300 jobs."

NAME_____

If the company's plans are vague at this point, that doesn't make them unambitious. Weyerhaeuser estimates capital costs over future years "could approach $500 million or more," a level of investment that clearly has environmentalists worried.

Their concern is understandable. "After investing 10 years of time, money and effort to preserve the delta, it's a terrible slap in the face," says Nancy Thomas, who takes issue with Weyerhaeuser's assertion that the rural Dupont site is appropriate for more intense industrial activity because of its long history of use. "No one in his right mind would build a munitions factory in a populated area, so any claim that every abandoned dynamite plant site is developable is pretty specious."

Just about every environmental group previously involved in the long fight to save the Nisqually River Delta from a fate as a deep water port has joined to meet what they see as the new Weyerhaeuser threat. A barrage of letters addressed to "Mr. George H. Weyerhaeuser" hit the Federal Way headquarters in the month after the company announced its plans.

"They've thrown us back to 1965," says Nancy Thomas. "We've put up our money; that's what burns us. 'If you want to protect it, buy it,' they said. So as soon as we did that, they moved in next door and endangered it. You can't buy all the land in the world."

The prospect of increased industrial activity on the Dupont site, whose western boundary directly fronts on the wildlife refuge's tidelands, is of more than casual concern to environmental groups and state agencies. "If a pulp mill goes in it would affect the quality of water and air," says Gene Dziedzic, the Game Department's deputy chief for environmental management. "There are a lot of 'I don't knows' here, but there is going to be some impact on wildlife, on the full gamut of songbirds, birds who live near the creek, hawks and owls, upland birds such as pheasants and grouse, black tail deer and fur bearing animals.

But Dziedzic, along with the bulk of environmental detractors, feels Weyerhaeuser's plans for the old Dupontdock have "the greatest potential for harm to the estuary."

Weyerhaeuser has said publicly that the dock, which lies less than a mile from the northern boundary of the refuge, would need to be altered to accommodate the larger 60,000- to 100,000-ton ships required by the export center it envisions. The present 640-foot dock, which has received vessels in the 600-foot range, will not be able to accommodate the 900-foot specially built ships that Weyerhaeuser plans to use. The deeper draft required by larger ships may even require that the present dock be replaced by a larger one in deeper water. Will any disruptive dredging be necessary? "It's unlikely," said one company planner. But Weyerhaeuser is not sure about the details nor even about the schedule the ships would keep: "One of these vessels could perhaps arrive each two to three weeks, with about a two-day loading time." Compared to the Dupont rate of one ship every three months, two a month at peak season--and using smaller ships--the Weyerhaeuser plans represent stepped-up dock activity.

NAME_____

As with Burlington Northern's Atlas Powder port across the delta, the DOE seems certain to make an issue of the city of Dupont's "urban" designation of the Dupont dock area. Although that designation in the city's Shoreline Master Plan was approved about a year ago, it recognized the Dupont corporation's decreasing use of the dock. The dock area lies between two "conservancy" areas and is also along shoreline designated as having "statewide significance," which brings it under DOE's jurisdiction.

Environmentalist Gordon Alcorn, who co-authored a report with Dixy Lee Ray (when she headed the Pacific Science Center) that helped win refuge status for the delta, sees the greatest threat to the Nisqually's delicate eco-system coming from water pollution caused by ships. "You can't put a boat anywhere without some pollution," says Alcorn. "They're going to say 'we'll keep it to a minimum' and I guess they will, but it is still a threat. Exhaust oil, spills, garbage, oily water from pumps, a certain amount of bilge water. It doesn't take much oily film to cut off oxygen. And they talk about loading logs, which means log rafts, which means bark gets in the water, and bark on the floor of the Sound hurts marine life. I think the whole area ought to go into preserve. As it is now, it is only half a preserve. The delta is a pretty fragile thing."

Other environmentalists warn of the possibility of leaks in the fuel bunkers of the big ships Weyerhaeuser has in mind. Marine biologist John Slipp says the tides in the Nisqually Reach are second in swiftness only to those in Deception Pass, posing a danger to navigation that might make leaks--and if a ship should happen to lose steerage, even ruptures--more likely. The crooked Tacoma Narrows channel invites more danger for deep draft ships. Pollution from spills in southern Puget Sound, from whatever source, would have catastrophic effects, says Slipp, because the flushing action south of the Narrows is slow, taking on the order of 48 days to replace itself. Contaminants polluting the deeper water would be even slower to disperse, he says.

The water of the Nisqually River Delta is currently rated AA, making it one of the state's cleanest. But Slipp says even "day-to-day, unavoidable minor contamination that builds up in confined water of the lower Sound would threaten and impair the sensitive eco-system." The destruction of a single food type for even planktonic animals sets in motion a series of negative effects upon animals further up the food chain. That, says Slipp, "could have the eventual effect of eliminating a valuable food type or rendering it unusable for humans."

Such a disturbance may have been responsible for the disappearance in lower Puget Sound of the harbor porpoise, which was a prevalent species in the 1940's and 1950's. Extremely scarce in the late 1950's, there has been no record of it for the last decade and a half. Pollution has also had a severe effect upon the seal population in the lower Sound; their activity is now restricted to the McNeil Island penitentiary. Studies of seal tissues strongly suggest, says Slipp, that PCB pollution is responsible for the animal's disease characteristics.

Many environmental objections may be valid, and are sure to be more narrowly beamed once Weyerhaeuser's plans become more crystalized. And they alone may constitute a case against degradation of the habitat itself sufficiently strong to deny Weyerhaeuser certain permits, especially with regard to the Dupont dock.

But an altogether separate case can be made, and probably will be, against the idea that a corporation should be permitted to operate its own private port--especially when several tax-supported public ports are already available. Weyerhaeuser contends none of the public ports can accommodate its special needs for a large amount of backspace from which to assemble giant export modules

NAME_____

that would weigh up to 50 tons each. In the first stage of Dupont development, finished wood products would be transported by train and truck from the company's mills and installations throughout Western Washington. In that sense, the Dupont location would provide the company with the utmost of convenience, but that does not mean that no other alternatives are possible. It does mean that the Dupont site is strongly preferred.

So far the company has yet to convince anyone save the city of Dupont, the Tacoma area Chamber of Commerce, contractors, labor groups and the area's ports that it really needs its very own dock. "One of the things we're concerned about," says Richard Wilmont, a spokesman for the ecological services division of the U.S. Fish and Wildlife Service, "is the precedent that would be set by a private company developing its own private docking facility. The ports of Seattle, Olympia, and Tacoma were set up for the purpose of loading and unloading material. On the west side of the delta Burlington Northern says it needs a pier. Are we going to have another company come along and say 'we need a pier, too?'

"We made a public statement to this that said it was up to Weyerhaeuser to show there is a real need for the Dupont dock. Fish and Wildlife's position is that Weyerhaeuser should maximize use of existing port facilities. When they're maximized, then we can start looking for others.

"As for the Nisqually Delta refuge, we feel you better have some good solid argument before you talk about damaging it."

"I can appreciate Weyerhaeuser's problem," says Flo Brodie, a transplanted New Englander who heads the Nisqually Delta Association and has been instrumental in fights to save it. "The public ports obviously need shaping up and perhaps what we need is a regional concept, combining the ports of Grays Harbor, Tacoma, Olympia. But why should we have to put up with a private port of this type on one of the most vital estuaries we have left?

"I don't say Weyerhaeuser is dishonest. They're ambitious like any big business," says Mrs. Brodie, who keeps a Xerox machine busy in her house so she can keep members of the NDA well informed. "But I don't think they've proven that they need a port of their own. The burden of proof lies with them. This is one of the last estuaries if its kind. It hasn't been highly developed or disturbed. So why this area?" That question must wait, along with many others.

Weyerhaeuser's purchase of the Dupont property and its undefined plans for it have raised more questions than can possibly be answered right now.

Some of them might be: How intensely will the company develop the Dupont site? Will Weyerhaeuser build a new dock, extend the old dock, or perhaps even seek to dredge the dock area? What adverse effects will increased dock activity, using bigger ships than in the past, have on the delicate Nisqually estuary? Should a private dock, with the precedent it sets, be allowed at all?

At the moment, at least, these questions seem likely to produce answers too weary or too weak to make Weyerhaeuser's case. Environmentalists, armed with the advantage of 10 years of background work and plenty of stamina, are going to be

NAME_____

tough to beat. And the Nisqually River Delta, possibly the least spoiled of all the nation's major estuaries, will be rescued again--but certainly not for the last time.

Permission to reprint from The Weekly Newspaper, July 21-27, 1976 issue granted by David Brewster.

NAME_____

PUBLIC HEARINGS ON DUPONT

by Kathryn Samuels

Before the June 9, 1976 presentation by Weyerhaeuser of it's plan for development of the Dupont site, Governor Evans and the Department of Ecology had announced that Weyerhaeuser had requested agencies at various governmental levels be participants in the planning process.

At the June 9th meeting, the DOE (Donald Provost, spokesman) indicated that the project is very complex, with many permits needed, and many levels of government involved - city of Dupont, regional, state, and federal agencies.

The DOE pointed out that they (DOE) have authority to permit or not permit certain activities - "even if it is to be a part, permits must be obtained."

DOE emphasized that we are now in the 'planning mode'; the 'permit mode' will come later. If there is a 'no go' situation, the DOE requested that it be identified early to shorten the time of the whole process. Several sub-teams to be formed in early August will be made up of agency decision-makers. (Citizen participants have been added to the sub-teams....ED.)

Many agencies, citizens, and organizations spoke at the June 23rd hearing. Speakers for the Department of Game, the Nisqually Indian Tribe, the Department of Fisheries and the U.S. Fish and Wildlife Service all stressed that the nursery-like quality of the Delta necessary for the future runs of salmon and other aquatic life must be preserved.

Many of the organization speakers that followed, stressed the length of time they have been working to save the whole Nisqually Delta area and how they must speak up again, this time to save it from a combination of government and industry - the DOE and Weyerhaeuser. They were also concerned about preserving the historic landmarks.

The highway Department noted that some changes in service roads will be needed, as well as changes in I-5 interchange and access features.

Mr. Asselstine of the Regional DOE expressed concern that the entire South Sound area could be affected because of the large ships expected - large wakes, erosion, and property damage.

Del McBride of the State Capitol and Historical Museum said "the Dupont site has been called 'the birthplace of a great state' and should be preserved."

Robert Ramsey of the Tahoma Audubon Society asked, "Are there going to be citizens on the sub-teams/" He pointed to the fact that under the Shoreline Management Act, the Dupont site is a 'shoreline of statewide significance,' so any change must be approved by the state. In addition, Mr. Ramsay state that "An increase in efficiency rarely means an increase in payroll." Will the 150 persons on the Dupont payroll be switched to Weyerhaeuser or will 150 different people be needed?

Thelmagene Collings, President, Tacoma-Pierce LWV* expressed concern for citizen participation. "We hope to be able to participate as members of sub-teams of the DOE to help answer the questions we have asked. "

* League of Women Voters

NAME _____

The Tacoma Area Chamber of Commerce endorsed the Weyerhaeuser plan for jobs needed for Pierce County; as did Clyde Hupp representing the Building and Construction Trades Council and Pierce County Central Labor Council.

Charles Raines gave a presentation suggesting that the soils of the area dictate the use. He showed slides delineating parks, recreation areas, methane plant, research center, historic areas, demonstration forest and numerous other possibilities, but not shipping and not industrialization.

The Department of Ecology presented the following time schedule:

- July to mid-August - assimilation and summarization of concerns.
- August - to set up sub-teams to study considerations for the planning process on such areas as navigation, transportation (on and off site), sensitive areas, historical aspects, etc.
- Early November - all information together, decision will be made as to final plans, and applications made for permits.

Reproduced by permission of League of Women Voters from "PSL Sound Waves," September 1976, Karen DesVoigne, Editor

NAME_____

WASHINGTON ENVIRONMENTAL COUNCIL STATEMENT

PORTIONS OF STATEMENT FOR THE PUBLIC MEETING ON THE PROPOSED WEYERHAEUSER DEVELOPMENT OF THE DUPONT-NISQUALLY SITE By Nancy Thomas

The character of the Nisqually Delta and its adjacent shorelines has become so highly valued and widely recognized that it is named in Washington's Federal Coastal Zone Program and the State Shoreline Management Act, is in part designated a National Natural Landmark and has been established as a National Wildlife Refuge. Refuge boundaries extend well north of the breakwater shown in Weyerhaeuser's slides and come to within twenty eight hundred feet of the old existing pier (That existing pier, incidentally, is at the north end of Dupont ownership. Any new or expanded facilities must either go straight out into the Reach or south toward the refuge.)

Ironically, protection of the Nisqually Delta is an instance in which the public responded to the old if- you - want - to - save - it - buy - it routine by doing just that. In addition to the protective laws we have passed, the people of Washington and of the United States have bought and are still buying the Nisqually Delta. But we can't buy the whole world. There will always be 'adjacent lands' and the uses on those lands can destroy everything we've worked and sacrificed our time and money to achieve. Because no matter how elaborate a developer's plans may be, he can't 'buffer' the water. And any mishap with this proposed super-pier will take place just a few minutes by moving water from our refuge!

The disillusionment is with the state government which seems to have forgotten what the public achieved at Nisqually. The disillusionment is with the Weyerhaeuser and Dupont Companies for proposing to convert a predominantly rural, low-intensity use area, the most historic site on Puget Sound, a site whose waters intermingle with those of the Nisqually National Wildlife Refuge, into a high-intensity industrial and export site complete with pulp mill and a pier which could handle an aircraft carrier.

According to George Weyerhaeuser, himself, this facility is intended to "integrate Western Washington's forests with the world." If that can be done with one pier, it's surely going to be some pier!

We have accepted and will continue to accept the existing pier and the current level of use. We will not accept a private port, and make no mistake, this <u>is</u> a port, on public wetlands adjoining the people's refuge. <u>That's no go</u>!

We are further disillusioned that written promises to the Washington Environmental Council and others of full participation turned out to mean a couple of public meetings and some written comment. Meanwhile, planning teams of Weyerhaeuser and state employees are meeting together. Why aren't the organizations who asked to participate on those teams? <u>That</u> would be consistent with the promises made to us.

And it might give us the chance to ask some of those famous 'what if' questions. Such as:

1. <u>What if</u>...a 900 foot, 100,000 deadweight ton ship loaded with bunker fuel lost steerage approaching the Narrows Bridge?
2. <u>What if</u>...the slightly improving water quality in the South Sound were started on the downhill road again by discharges associated with this project?

NAME_____

3. What if...all explosives plants, located in unpopulated rural areas with huge buffer zones, were declared to be industrial sites? Such use at Dupont and Atlas alone can create 'Strip City', solid development from Tacoma to Olympia. We've heard Weyerhaeuser quote frequently from "Alternatives for Washington." Isn't urban sprawl in metropolitan areas precisely what participating citizens did not want?
4. What if...export facilities were located or expanded in existing port developments? Tacoma. Everett. Longview. Grays Harbor. The Shoreline Management Act surely envisioned intensive development and redevelopment of existing ports, not shoreline industrial leapfrog!
5. What if..the project causes slow long-term deterioration of our refuge? Will you tear out the super-pier? Will you create another Nisqually Delta in mitigation? Maybe these are unreasonable questions. But maybe this is an unreasonable place for the project?
6. What if...the Weyerhaeuser Company did an EIS (Environmental Impact Statement) on the total project and then invited public comment. We've been told by DOE (Department of Ecology) to justify a 'no go' decision. Only we have not really been told what's going where, or when, or how big, or how many, or how anything! We haven't been told anything about water quality, littoral movement, baseline data on flora and fauna.
7. What if...the state suggested that the burden of justification be placed where it legally belongs: on the applicant proposing a development in public waters?
8. What if...we just quit going at this backwards, quit asking the people to justify their wish, expressed over eleven years, to protect and preserve this magnificent delta system?
9. Or, what if...we just took it for granted that the people who for eleven years have said 'yes' to Delta protection were also saying 'no go' to port development?

Reproduced by permission of League of Women Voters from "PSL Sound Waves," September 1976, Karen DesVoigne, Editor

NAME_____

AN INTERVIEW WITH THE MAYOR OF DUPONT

"We're the ones that are going to make the decision." The city of Dupont will be the local governmental unit that will issue the permits to the Weyerhaueser Company. According to the Mayor, the city will issue no permits until the planning commission and the city council has seen the total land use plan. John Iafrati stated over and over his concern for local control. He feels that this issue may bring a court test of the Shorelines Management Act. The city plans to hold public hearings on each permit required. Any and all improvements such as roads and utilities must be paid for by Weyerhaeuser.

Dupont, pop. 500, is mostly retired military. The tax base is only $6,000. The city and schools can use the added tax base provided by the Weyerhaeuser Company.

Mayor Iafrati felt that the public hearings held by the DOE were "stacked" with extreme environmentalists. The mayor is most concerned with the problem of private rights to sell land, vs., the public right to save the environment. At present, Mayor Iafrati personally feels that the Weyerhaeuser Company will prove to be an asset to the city, while also protecting the environment.

By Thelmagene Collings
Tacoma-Pierce

Reproduced by permission of League of Women Voters from"PSL Sound Waves," September '76, Karen DesVoigne, Editor.

NAME_____

DUPONT DEVELOPMENT

by George Weyerhaeuser

One of the things that makes Weyerhaeuser's development of the Dupont site a public issue to many groups, I believe, is that it represents far-reaching change.

For most of the past 130 years - including the first 75 years of Weyerhaeuser Company - Washington's forest products shipments went largely to other states, with only a small portion going overseas.

Now the focus is changing, for two major reasons:

- The growth of the forest products industry in the South, and of Canadian exports to the U.S., have steadily cut into the major U.S. markets for Northwest producers. Both areas can ship into the Northeast, for example, far more cheaply than we can.
- More importantly, the increasing investment of money required to regenerate and manage the forests requires a steady flow of income , not tied to the ups and downs of a single market economy.

Thus, as agriculture has done in past decades, Washington's forest products industry must increasingly turn to world markets to assure broad-based demand for products. Such demand will permit a sustained flow of competitively priced goods - which will in turn support long-term, high-quality management of our forests.

That is a historic change for Washington's largest industry. It is equivalent in importance to the concept of forest regeneration - and has similar implications for stability and growth in Washington's forest products industry and thus for stability and growth in the state's economy.

Because of the geographic pattern of Weyerhaeuser's timberlands ownership and manufacturing locations we have for some time been studying potential sites for an export center somewhere in the South Puget Sound area. Dupont Company offered its site to Weyerhaeuser early in 1975, and negotiations took place between then and January of this year.

Several features of the site are important to us. One is its history of industrial use. The Dupont site is not pristine. Indeed, part of its historical value lies in the fact that it was the first commercial site in Western Washington - the Hudson's Bay company trading post established in 1833.

Dupont Company has manufactured explosives there for 70 years - unobtrusively providing employment for several hundred workers. The 600 foot dock at the lower end of Sequalitchew Creek has been used regularly, although use has dropped off in the last few years. The site is roaded, and has rail access. Some 600 acres of it are in use by Fort Lewis, for military exercises and a sanitary landfill.

Another important factor is the size of the site. Five square miles, industrially zoned by the City of Dupont, offer an excellent location for unobtrusive industrial operations to continue, well buffered from adjacent land uses.

But the most important feature of the site, to us, is the quality of its access to deep water. At many ports in Western Washington, the water remains shallow for long distances from shore, and dredging is frequently required. At Dupont, along the northern portion of the shoreline, a water depth of 60 feet can be found within 200 feet of the lowest low-tide line.

NAME_____

Thus, when the site was offered to us, we could readily envision export activity centered around a single deep-water dock, with such products as lumber, plywood, logs, pulp and paper bundled for shipment on the well-buffered higher ground behind the shoreline bluff. Here, we felt was the chance to tie together Weyerhaeuser's capabilities in forestry and manufacturing, with the developing world market orientation for Washington's forest products.

Moreover, we could expand Weyerhaeuser's role in world markets without increasing the congestion of existing ports, or making them overly dependent on one industry. And, by controlling our own centralized export site, we could develop new technologies and efficiencies in handling, shipment-assembly and loading which would be dependent on large acreages for storage not available in developed public ports.

We also saw possibilities for sawmilling and, for the longer term, some sort of pulp and/or paper facilities. Much of our research today is directed toward development of new processes which could make pulp and paper a 'clean' industry with low water-use requirements - and we are confident that this research eventually will succeed.

At the time the purchase agreement was signed last January, our thinking was no more detailed than that. Even today, our planning and engineering consists only of conceptual drawings - nothing more.

The reason is two-fold. First, we have the time for planning because our method of purchasing the property is to trade other industrial land for it. Weyerhaeuser will not take possession of the site until early 1978.

In addition, we want to take the time - to make sure that our planning is done carefully and right, with full attention to the environmental and social values of the site itself, and of the Nisqually Delta and Wildlife Refuge that border it to the south.

I and other Weyerhaeuser managers recognized, from the outset, that anything we do at Dupont will have to be done within a series of valid constraints. But we do not feel that those constraints will be overwhelming barriers.

Impacts on the Nisqually, for example, must be a major constraint in dock design. The existing dock is nearly a mile 4,800 feet - from the breakwater at the mouth of the Nisqually, and more than half a mile from the northern boundary of the tidelands recently acquired by the U.S. Fish and Wildlife Service. That dock is about 400 feet too short for the type of shipping we envision. Yet once all environmental constraints are known, it should be possible to design a new, longer dock that will have less chance of damage for the Delta, even with greater shipping use, than does the existing dock.

Similarly, environmental and social constraints (such as traffic patterns within the City of Dupont) will have a major impact on road system design, and on the location of a product staging area or manufacturing zones. Those locations, in turn, will have an impact upon the design of equipment for handling and loading products, and thus on design of the ships which we will have built to our specifications - including environmental requirements.

NAME_____

In short, from the very first, we did not want to begin serious and detailed planning, for either export shipping or manufacturing, until all sensitivities were fully identified and prioritized - not just by Weyerhaeuser, but with the involvement of others as well.

Thus, right after the purchase of the site, we asked the State to lend agency help in recognizing and understanding the environmental constraints, so that problems could be addressed and solved before the permit process, rather than after.

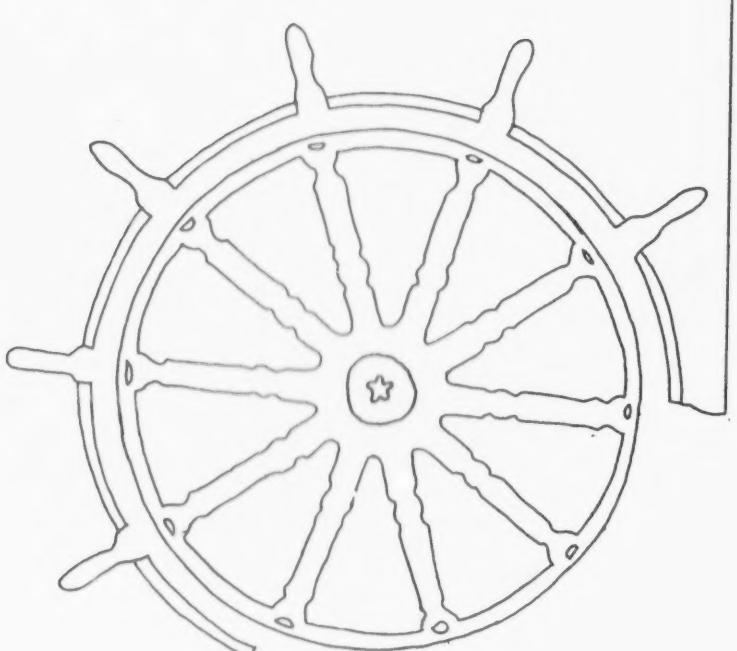
The Department of Ecology, named by Governor Evans as the lead agency in this process, called three public meetings to obtain concerns, and designed a sub-team system of dealing with individual segments of the total development.

A few weeks ago, we also contracted with the Pacific Northwest Division of Battelle Memorial Institute to design a 'base-line' environmental study of the area. Battelle will determine what kind of information is needed to understand the present environmental character of the site, and design the tests necessary for gathering that information. After this is done, either Weyerhaeuser or a consultant group will gather data - for more detailed planning, and eventually, as a benchmark to check performance.

The Puget Sound area is growing - in population, in job requirements, in economic complexity. The logic of what Weyerhaeuser proposes to do at Dupont would seem to be sound not just for the company, but for the people of the Puget Sound area. A renewable resource, turned into clean products by Washington employees, moved through water beside it - it's difficult to see how any development could be more desirable, if reasoned and conscious care is taken for environmental and social needs. The type of planning process we have begun is designed to ensure that such care is taken on this site when Western Washington began as an economic entity. It is designed to ensure that we at Weyerhaeuser do not get trapped in our own viewpoint as we proceed. To our knowledge, this is the first time - beginning with the hearings, but extending through access to the DOE's sub-teams as well - has been invited for a private venture before the legally mandated permit procedure.

Such involvement is, we think a significant opportunity for the people of Washington State to give active voice to their future.

Reproduced by permission of League of Women Voters from"PSL Sound Waves,"September 1976, Karen DesVoigne, Editor.



EVALUATION
VOCABULARY
BIBLIOGRAPHY

Teacher Information

STUDENT EVALUATION: SQUALLS ON THE NISQUALLY

1. Write a brief overview of the Nisqually conflict.

   (Students should include these points:
   -Burlington Northern's interest in a port
   -Municipal port for Port of Tacoma Authority
   -The purchase of Brown's Farm for the Wildlife Refuge
   -The Weyerhauser purchase of the Dupont site and its proposals)

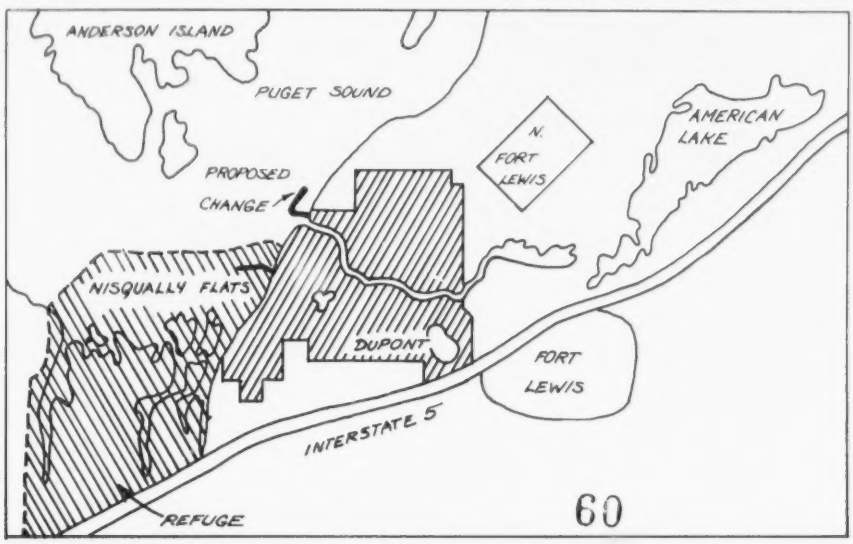
2. Who is the Nisqually Delta Association?

   (A consortium of several conservation groups which have fought to retain the Nisqually Delta in its natural state as an unspoiled estuary)

3. Analyze the conflict between the Weyerhauser proposal and the Nisqually Delta Association. Be certain to include a statement regarding Weyerhauser's exact proposal.

   (Students should mention Weyerhauser's $12 million purchase of land. The plan is to have a 300-500 acre marshalling yard and warehouse; increase the length of the pier to 1300 feet; and the modification of an existing roadbed for transportation between the plant and the dock. The threat is to the estuary and students should mention the potential problems such as air and water pollution; log rafting; increased shipping; potential oil spills and the future growth plans of Weyerhauser.)

4. Diagram the Nisqually Delta Region. Show where the wildlife refuge is and where the Weyerhauser land is. Show also the proposed changes.



Teacher Information

5. Summarize the procedure Weyerhauser must follow to get approval for their plan.

(They must do baseline studies of the environment. A draft environmental impact statement must be prepared for their proposal. The E.I.S. must be made public and public hearings held. The D.O.E. and the various agencies involved must approve or reject the proposal. Some students may go further to say that following approval by the state Weyerhauser would then apply to the Army Crops of Engineers for approval to begin the work on the pier.)

NAME_____

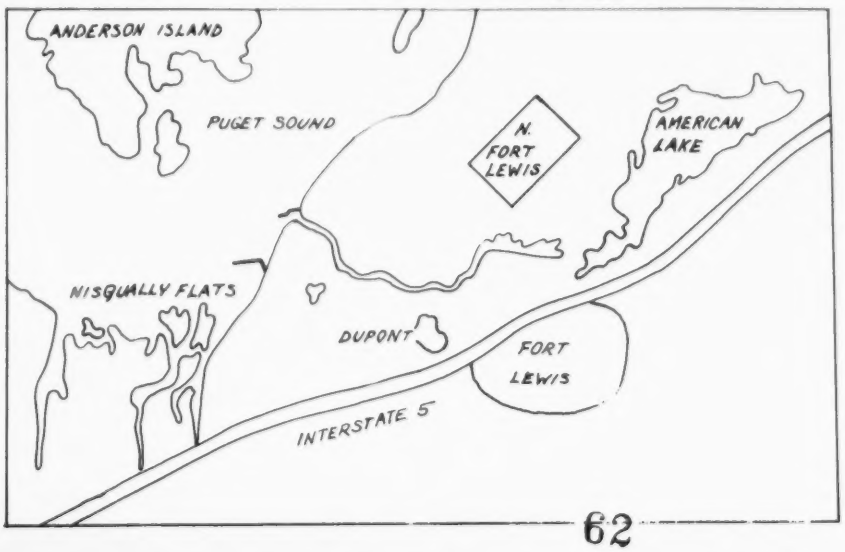
STUDENT EVALUATION: SQUALLS ON THE NISQUALLY

1. Write a brief overview of the Nisqually conflict.

2. Who is the Nisqually Delta Association?

3. Analyze the conflict between the Weyerhauser proposal and the Nisqually Delta Association. Be certain to include a statement regarding Weyerhauser's exact proposal.

4. Diagram the Nisqually Delta Region. Show where the wildlife refuge is and where the Weyerhauser land is. Show also the proposed changes.



NAME_____

5. Summarize the procedure Weyerhauser must follow to get approval for their plan.

Teacher Information

VOCABULARY

Estuary - a semi-enclosed arm of the ocean filled partly with fresh and partly with sea water; a place where a river meets the sea, and the water is brackish. It is a transition zone.

Brackish water - fresh water (from rivers) which mixes with the saline water from the ocean.

Shoreline Management Act - laws in the State of Washington which provide planning guidance and regulation for use of land along shorelines. It exists in compliance with the federal Coastal Zone Management Act.

NAME_____

VOCABULARY

Estuary -

Brackish water -

Shoreline Management Act -

BIBLIOGRAPHY

Albright, Richard. "Intertidal Disposal of Dredged Material in Washington Estuaries" from The Use, Study and Management of Puget Sound. Proceedings March 23-24, 1977, University of Washington, Seattle, Washington, Sea Grant.

Amos, William H. The Life of the Seashore. Our Living World of Nature Series, MacGraw-Hill Company, New York, 1966.

Bella, Dr. David A. Role of Tidelands and Marshlands in Estuarine Water Quality. Proceedings: Northwest Estuarine and Coastal Zone Symposium, OSU.

Cox, William S., Director. Oregon Estuaries. State of Oregon Division of Statelands, June 1975.

Clark. Wild Flowers of the Sea Coast.

Clark, Lewis. Wild Flowers of Marsh and Waterway. Gary's Publishing Ltd., Sidney, B.C., 1974.

Derickson, Dennis L. "Bays and Estuaries: The Ultimate Shoreline Management: Challenge for Local Government" from The Use, Study and Management of Puget Sound.

Duenen, P.H. Realms of Water, Some Aspects of Its Cycle in Nature. John Wiley and Sons, 1963.

Duxbury, Alyn. "Description and Functional Classification of Estuaries Found in the Pacific Northwest" from Proceedings-Northwest Estuarine and Coastal Zone Symposium, Bureau of Sport Fisheries and Wildlife, Portland, Oregon, October 1970.

Forkes, Robert D. Floral Description of the Maplewood Mud Flats and the Nanaimo River Estuary. Canadian Wildlife Service, November 1972.

Green, J. The Biology of Estuarine Animals. University of Washington, Seattle, Washington, 1968, 401 pp.

Gross, M. Grant. Oceanography. Charles E. Merrill Publishing Company, Columbus, Ohio, Third Edition, 1976.

Lauff, G. (editor) Estuaries. American Association for Advisory of Science, Washington, D.C., 1967, 757 pp.

Lynam, L. Estuaries: A Resource Worth Saving. Washington Department of Game, 1972, 21 pp.

Malkus, A. Meadows in the Sea.

Munz, Phillip. Shore Wildflowers of California, Oregon and Washington. University of California Press, Berkeley, 1964.

Nehls, Harry B. Familiar Birds of Northwest Shores and Water. Portland Audubon Society, 1975.

Niering, William A. The Life of a Marsh. MacGraw-Hill, New York, 1966.

Nihoul, J. (editor) Hydrodynamics of Estuaries and Fjords. Elsevier Science Publishers, Amsterdam, 1978.

Prangle, Laurence. Estuaries: Where Rivers Meet the Sea. MacMillan Company.

Smith, Frances. The First Book of Swamps and Marshes. Franklin Watts, 1969.

Sverdrup, H.U., Johnson and Fleming. The Oceans, Their Physics, Chemistry and General Biology. Prentice Hall, Englewood Cliffs, New Jersey, 1946.

Teal, John and Mildred. Life and Death of the Salt Marsh. Little, Brown and Company, Boston, 1969.

Ursin, Michael J. Life In and Around the Salt Marshes. Thomas Y. Crowell Company, New York, 1972.

Washington Marine Atlas. Volumes 1 and 2, Department of Natural Resources, Division of Marine Land Management.

Wayburn, Peggy. The Edge of Life. Sierra Club, 1967.

Wight, F.F. A Primer to Estuarine Oceanography. McGraw-Hill, 1973.

Williams, Jerome. Oceanography: An Introduction to the Marine Sciences. Little, Brown and Company, Boston, 1962.

Zottoli, Robert. Introduction to Marine Environment. C.V. Mosby Company, 1973.

Curricula

Basins, Estuaries and Fiords. LSU Marine Studies High School Curriculum. James P. Schweitzer, Center for Wetland Resources, LSU Baton Rouge, Louisiana 70803, 1977.

C.O.A.S.T. (Coastal Oceanic Awareness Studies). University of Delaware: Neward, Delaware.

#202 Distribution of Salt Marsh Life
#230 Marshes: Nature's Bounty
#308 Salinity Changes in a Tidal River
#311 Simulation Game: Superport

Estuary Studies. Dr. Clifford Anastasiou, Vancouver Environment Education Project, University of British Columbia, 1975.

Teacher Resource Guide to the Film "Crisis in the Estuary"- Marine Environment Curriculum Study (see C.O.A.S.T. for bibliography data) C.O.A.S.T. #203, Fall 1974.

Teacher Resource Guide to the Film "The Endangered Shore"- Marine Environment Curriculum Study, Marine Advisory Service: University of Delaware: Neward, Delaware. C.O.A.S.T. #206.

Utilization of Estuarine Organisms by the Indians, C.O.A.S.T. #210.

Films

"The Billion Dollar Marsh"

"Crisis in the Estuary" Milner, Fenwick Inc. C.O.A.S.T. #206, C.O.A.S.T. #203.

"Ecology of a Tidal Slough"

"The Endangered Shore" Arden Films, Inc. C.O.A.S.T. #206.

"Marsh Waters - Waste or Wealth" C.O.A.S.T. #206

"Marshland is Not Wasteland" Roy Wilcox Productions, Inc. Meridian, CT.

"Men at Bay"

"Ways of Water"

"Where Rivers Meet the Sea" - Facts and Issues, League of Women Voters of the United States, February 1970.

"World in a Marsh"

Interviews

Flo Brodie, Nisqually Delta Association

Ellie Hencke, Nisqually National Wildlife Refuge

Lee Robinette, Weyerhauser Industries

Emily Ray, Department of Ecology

Periodicals

Cushing, William. "Nisqually Flats Fight, Round 2." The Weekly, July 21-27, 1976.

Davis, Raymond. "Largest Unspoiled Estuary." Defenders of Wildlife Magazine, February 1977.

DesVoigne, Karen (editor) "PSL Sound Waves." Seattle League of Women Voters, September 1976.

Floreo, Anthony. "Plants of the Tide Marsh." National Resources and Environmental Control.

Friebertshauser, Mark A. and Alyn C. Duxbury. A Water Budget Study of Puget Sound and Its Subregion." Reprint form. Limnology and Oceanography.

Goldberg, Edward D. "Pollution History of Estuarine Sediments." Oceanus - Estuaries, Volume 19, No. 5., Fall 1976.

Hampson, George R. and Edwin T. Moul. "Salt Marsh Grasses and #2 Fuel Oil." Oceanus - Oil in Coastal Waters, Volume 20, No. 4., Fall 1977.

Hitchcock, Stephen W. "Can We Save Our Salt Marshes?" National Geographic, Volume 141:6, June 1972.

Kellerhals, Peter and J.W. Murray. "Tidal Flats of Boundary Bay, Fraser River, Delta B.C." Bulletin of Canadian Petroleum Geology, Volume 17, No. 1, March 1969, pp. 67-91.

Leon, Hap. "Salt Marshes." Sea Pen, Volume 4, No. 2, Spring 1975.

"Nisqually in Conflict." Puget Sound Leagues of Women Voters, October 1970.

Officer, Charles B. "Physical Oceanography of Estuaries." Oceanus - Estuaries, Volume 19, No. 5, Fall 1976.

Phillips, Ron. "Eelgrass and Associated Critters." Sea Pen, Volume 3, No. 2.

Schroeder, Robert and Linda Haughey. "Distribution of Salt Marsh Life." University of Delaware. Sea World, Winter 1977-78.

Sternberg, Richard W. and Janice L. Johnson. "The Birth and Death of Estuaries." Pacific Search, August 1977.

Thayer, G.W., D.A. Wolfe, and R.B. Williams. "Impact of Man on Sea Grass Systems." American Scientist, 63:288-296.

"Threatened Marsh Snaps at Observers" Wilmington Morning News, October 4, 1971. n.p.

Valiela, Ivan and Susan Vince. "Green Borders of the Sea." Oceanus - Estuaries, Volume 19, No. 5, Fall 1976.

Washington Marine Atlas, Volumes 1 and 2, Department of Natural Resources, Division of Marine Land Management.

"Where Rivers Meet the Sea." Facts and Issues, League of Women Voters of the United States, February 1970.

Miscellaneous

City of Ocean Shores, Marine Information Center, Sea Grant, Grays Harbor Walk.

Dynamics of Puget Sound, Cannon G.S., 442-1960 (MESA).

Exchange Processes in the Strait of Juan de Fuca, Rattray, 206-543-5189.

Mathematical Studies of Stratified Flows in Nearshore Marine Environment, Dworski DF Winter, 532-5242.

Nisqually National Wildlife Refuge: Bill Hesselbart . Manager
2625 Parkmont Lane
Building A-2
Olympia, WA 98502

Salt Wedge Estuaries, Mitsude E. and Rattray, 543-1056, Estuarine and Coastal Marine Science, Volume 2, No. 4.

Shoreline Management Act: John Spangenburg
City Planner, Kirkland

State Game Department
600 North Capital Way
Olympia, WA 98502

Tidal Flow and Pollutant Dispersion in Estuaries, C.E. Pearson.

Turbulent Mixing in Estuarine Waters, J.D. Smith, 543-9279.